DAAAC™ 4.0
User's Manual
Document 2 - Appendices

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Figure 1-1 - DAAAC Database Organization

2 Appendix B - DAAAC Dialogs

This appendix provides a complete description of the controls in each dialog box within DAAAC. Each dialog is first presented as an image. The image is followed by a brief description and a table detailing the controls. Finally, all methods of accessing the dialog are listed. Note that only DAAAC specific dialogs are detailed here. Other standard Windows dialogs that may appear within the DAAAC application, such as standard file browsers or print configuration dialogs, are not included.

Most of the information in this document is also available via the online help. Open the dialog, and then click <F1> to start the online help.

2.1 Acquire Dialogs

These dialogs are accessed through the Acquire menu system and toolbars or from other dialogs in the Acquire module. Some dialogs are accessible from other modules as well. In those cases, the dialogs are presented here and back referenced in subsequent sections.

2.1.1 Save Named Configuration

2.1.1.1 Dialog

Figure 2-1 - Save Named Configuration Dialog

2.1.1.2 Discussion

Store Named Configuration saves the current DAAAC configuration as a Named Configuration for later restoration. The configuration includes displayed stations, instruments and their settings, Global Settings and Calibration settings. See Restore Named Configuration, immediately below, for instructions on how to restore the DAAAC system to this named configuration.

2.1.1.3 Details

Item	Description
Name	A unique name for the configuration.
Comment	Optional description or comment to help identify the configuration.
Save	Saves the current configuration, using the given name and comment.
List	All previously saved Named Configurations.
Update	Updates the configuration selected in the list box to the current DAAAC system's configuration.
Delete	Removes the currently selected configuration from the database. Once a Named Configuration is deleted, it can not be recovered.

2.1.1.4 How Accessed
- File->Store Named Configuration

2.1.2 *Restore Named Configuration*

2.1.2.1 Dialog
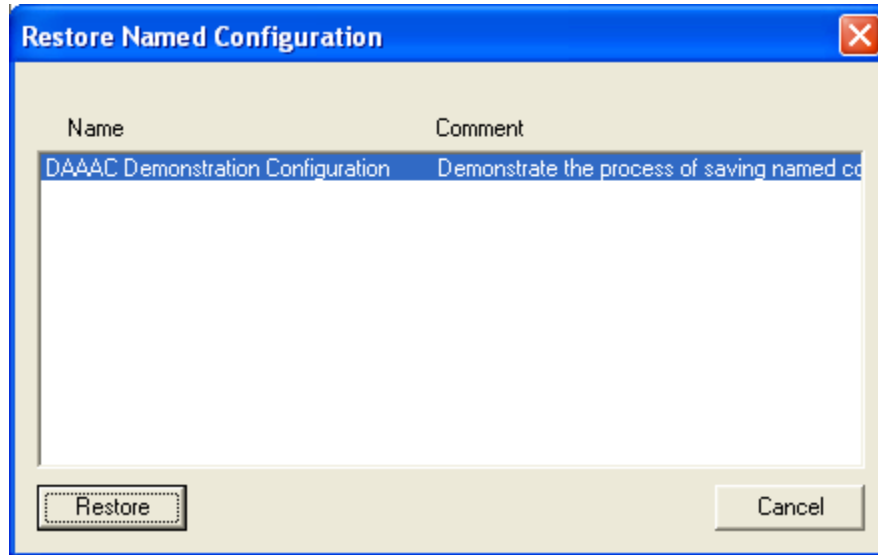
Figure 2-2 - Restore Named Configuration Dialog

2.1.2.2 Discussion

The Restore Named Configuration dialog retrieves a previously stored Named Configuration. See Store Named Configuration, immediately above, for instructions on how to save a configuration. When a name is selected, the instrument, Global and calibration settings in place at the time when the configuration was saved are restored to the original state. Each station, the station rack, Global Settings and all Calibration (graph) settings will be restored exactly as they appeared when the configuration was saved.

Restore also returns the configurations of any remote stations that were part of the original named configuration.

2.1.2.3 Details

Item	Description
Name	Listing of all saved Named Configurations.
Comment	Optional descriptions of each Named Configuration.
Restore	Starts the restoration of the named configuration selected in the list box
Cancel	Dismisses the dialog without restoring a configuration.

2.1.2.4 How Accessed
- File->Restore Named Configuration

2.1.3 Readout Order

2.1.3.1 Dialog
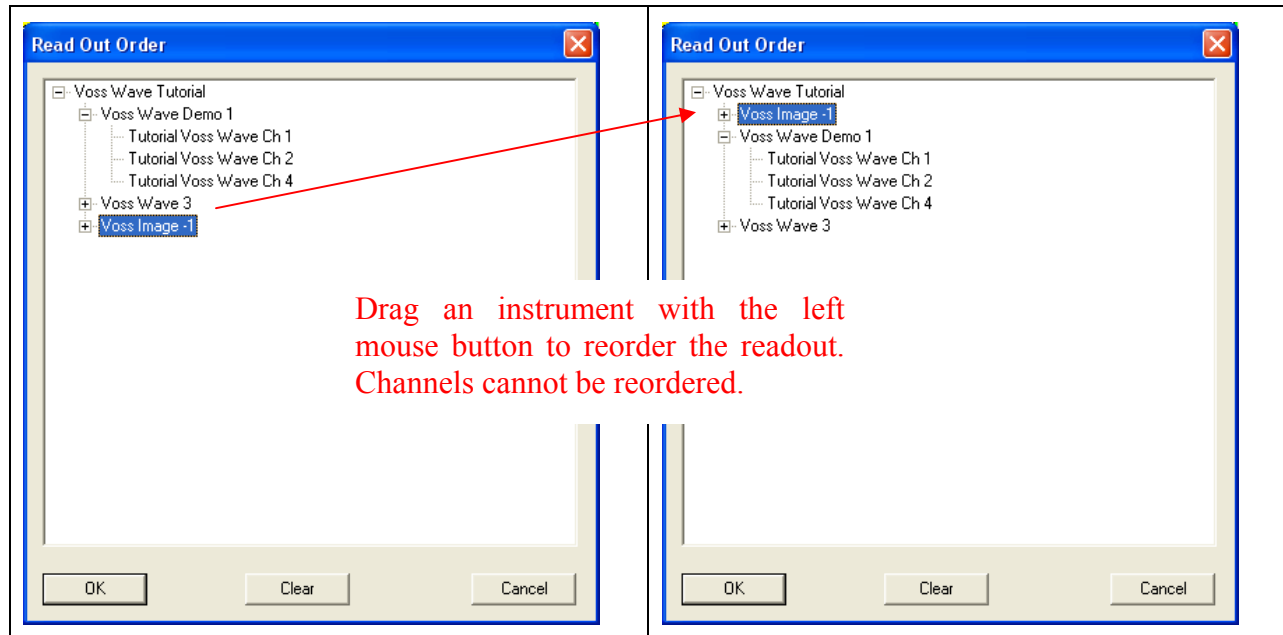
Figure 2-3 - Changing Readout Order

2.1.3.2 Discussion

The Readout Order dialog specifies the order in which instrument channels are transmitted and subsequently displayed by analysis stations. To change the display order, select a digitizer (or station if more than one) with the left mouse button and drag it to a different location on the list. When an item is released, it is inserted in the list immediately after the item it is released on. The order of channels within an instrument cannot be changed. Stations must be read out as a group. You cannot specify an order that interleaves instruments from different stations. The first item in the readout order is displayed in the upper-left corner in Analyze. The last item will be in the lower-right corner. Choosing Clear restores the default order.

2.1.3.3 Details

Item	Description
List	An Explorer-type tree listing, in hierarchy, all stations, instruments and channels in the current configuration.
OK	Close the dialog. Accept any changes made to the readout order.
Clear	Return to the original readout order.
Cancel	Dismisses the dialog without adjusting readout order.

2.1.3.4 How Accessed

- Preferences->Read Out Order

2.1.4   Figure of Merit

2.1.4.1   Dialog
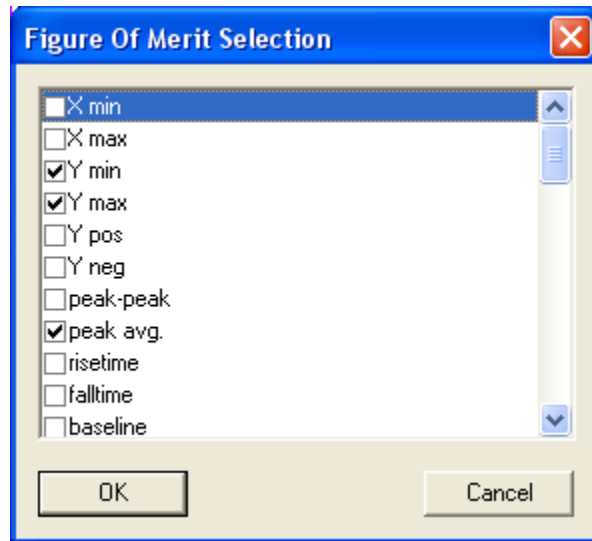
Figure 2-4 - Select Figures of Merit to Apply to Waveforms

2.1.4.2   Discussion

This dialog is used to enable or disable one or more Figures of Merits (FOMs) to be derived from the waveform data during data acquisition.

2.1.4.3   Details

Item	Description
List	A fixed collection of the available FOMs, along with check boxes to allow a specific set of FOMs to be enabled (checked). Unchecked FOMs will not be applied.
OK	Close the dialog. Accept any changes made to the enabled FOMs.
Cancel	Dismisses the dialog without adjusting FOMs.

2.1.4.4   How Accessed

- Preferences->FOM Selection

2.1.5 Rescale Racks

2.1.5.1 Dialog
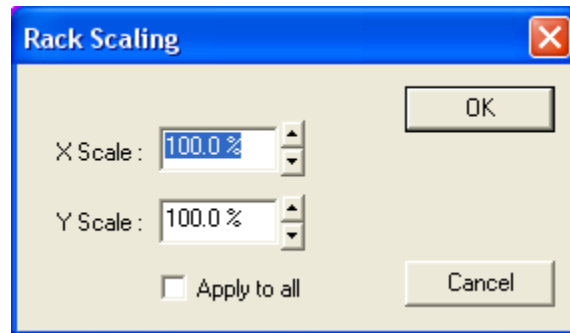
Figure 2-5 - Rescaling Racks

2.1.5.2 Discussion

Rescale Racks activates the Rack Scaling dialog, which changes the size of Acquire's display racks. The numbers for the x and y axis are a percentage of an arbitrary size, which, at full scale (100 percent), will display four instruments vertically, and two racks horizontally.

2.1.5.3 Details

Item	Description
X Scale	Horizontal scale percentage.
Y Scale	Vertical scale percentage.
Apply to all	When checked, the x and y scale amounts are applied to all open racks (stations).

2.1.5.4 How Accessed

- Preferences->Rescale Racks

2.1.6 Add Instruments

2.1.6.1   Dialog
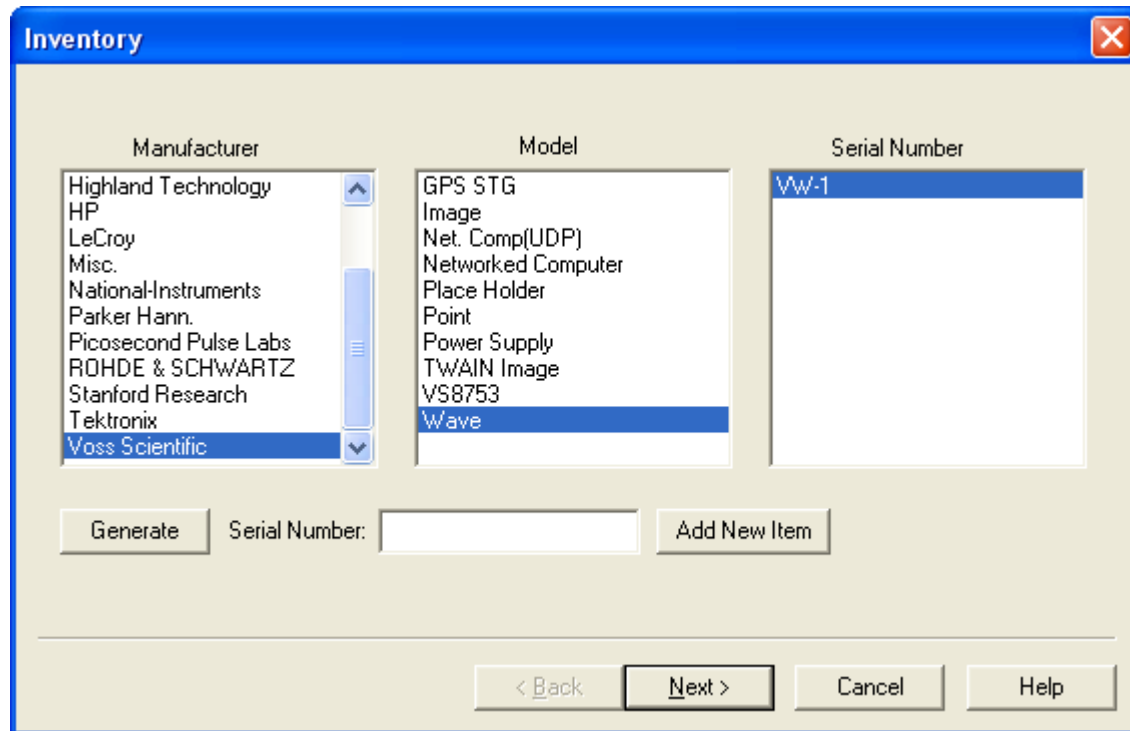
Figure 2-6 - Add Instrument/Inventory Dialog

2.1.6.2   Discussion

The Add Instrument to Rack: Instrument dialog, activated from the rack pop-up menu or when copying an instrument from one rack position to another, is the first page in the setup wizard. It is used to select an instrument (manufactory, model and serial number) from the existing inventory. A serial number must be highlighted before the wizard will allow the next page to be activated.

The dialog may also be used to add a new instrument to the inventory before inserting it into the rack. The operations proceed as follows:

1. Select a Manufacturer
2. Select a Model
3. If adding an instrument to the inventory, generate a serial number. Either type a serial value into Serial Number: or click Generate to create a computer-defined value.
4. If adding an instrument to the inventory, click Add New Item to register the item, by serial number, in the inventory. The item will appear in the Serial Number list.
5. Select an instrument from the Serial Number list.
6. Click Next> to proceed with the setup.

2.1.6.3   Details

Item	Description
Manufacturer	Listing of available manufacturers, which is dependent on the capabilities allowed to the installed DAAAC system.
Model	Listing of available model numbers corresponding to the currently selected manufacturer. Models are added to the inventory by the use of the Add Instrument dialog.
Serial Number (List)	Listing of available serial numbers corresponding to the currently selected model. Serial numbers are added to the inventory by the use of the Add Instrument dialog.
Generate Serial #	Creates a new and globally unique (GUID) serial number. Each number generated by this function is guaranteed to unique.
Serial Number (Edit)	Allow serial number to be specified by user.
Add New Item	Adds the current serial number to the Serial Number listing.
Next (button)	Activates the next page in the setup wizard. Next is valid only if a serial number is highlighted.

2.1.6.4   How Accessed

- Station Config->Add Instrument
- Right-click in an empty position in a rack and select Add from the popup menu.
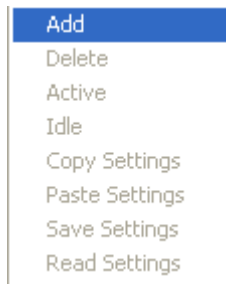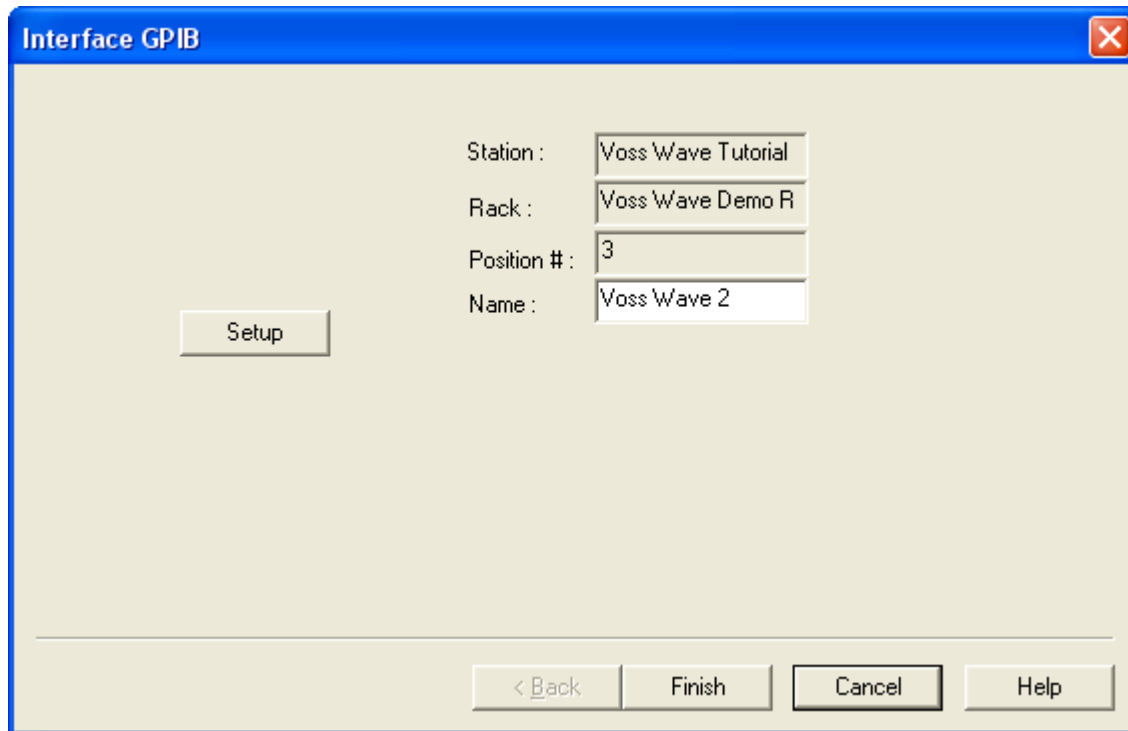
Figure 2-7 - Rack Right-Click Popup Menu

2.1.7 Setup Dialog

2.1.7.1 Dialog

Figure 2-8 - Instrument Setup Dialog

2.1.7.2 Discussion

The Add Instrument to Rack: Interface GPIB dialog configures GPIB data and assigns a name for the instrument. This dialog can be activated only from the Instrument dialog (first page of the Add Instrument To Rack wizard, on the second page in the Setup wizard. In some cases only some of these fields are displayed. (e.g. for a USB instrument no GPIB address information is required). If present the Setup Button MUST be clicked and the setup options specified. These are instrument model specific and may include interface information, memory options or other options in the hardware.

If no GPIB interface is present on the instrument the dialog will appear without GPIB controls in order to allow the instrument to be named and to present the Setup button. If the Setup button is shown, it must be pressed before Finish may be clicked to close the dialog. Parameters entered in any subdialog that appears when Setup is clicked are permanent and cannot be changed once Finish is clicked.

2.1.7.3 Details

Item	Description
Board Number	Serialized identifier of the local GPIB board to which the instrument is attached. Normally this value will be '0'.
Primary Address	Unique address. This is a numeric value in the range 0-31 that identifies the GPIB port on the instrument.
Station	Current Station Name.

Rack	Rack number at which this instrument will reside.
Position	Position in the rack for this instrument.
Name	Optional name for the instrument.
Finish	Completes the task of adding an instrument to the rack.

2.1.7.4 How Accessed

- Station Config->Add Instrument
- Right-click in an empty position in a rack and select Add from the popup menu.

The dialog appears, when adding a new instrument, after <u>N</u>ext> is clicked on the Add Instruments dialog.

2.1.8 Instrument Settings

2.1.8.1 Dialog
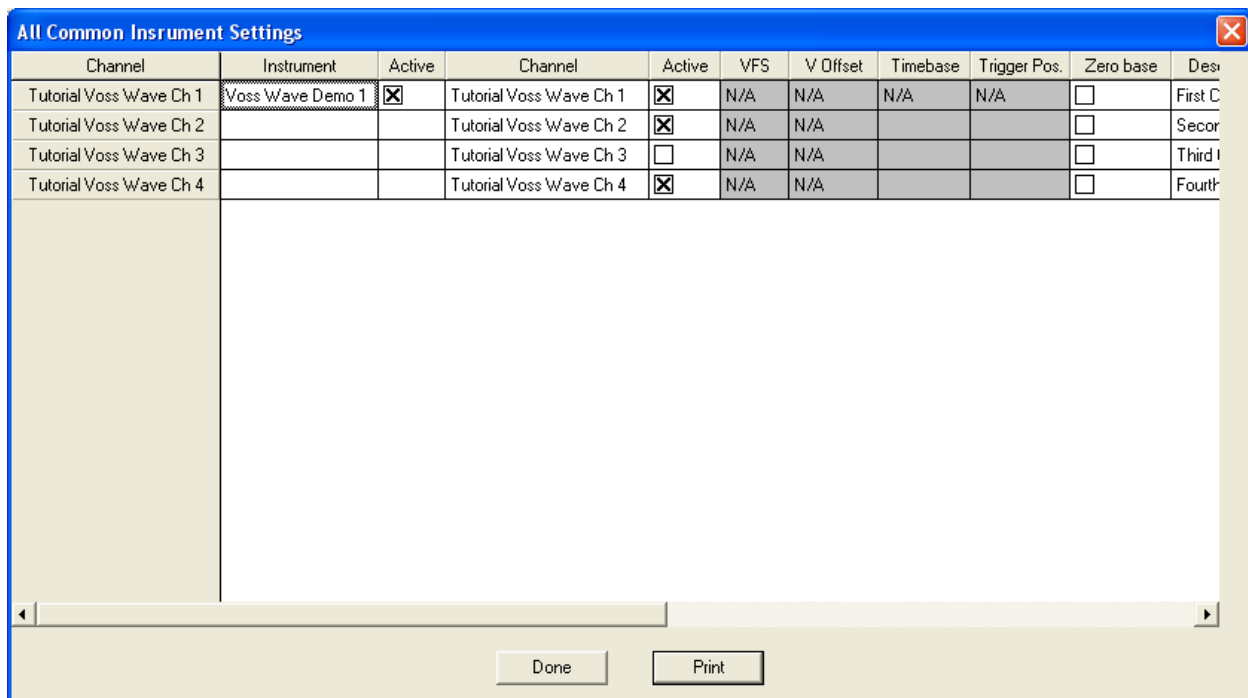
Figure 2-9 - Instrument Settings Dialog

2.1.8.2 Discussion

The Instrument Common Settings dialog lists all instruments and channels that exist in all open stations. It also displays several settings common to all instruments. This grid is an efficient method for quickly viewing these common settings, and gives the ability to change them without having to activate the instrument's dialog. Instrument Active, Channel Active, Zero base and Auto Export can be toggled on/off directly from the map. Alternatively, the instrument's dialog may be activated by right-clicking on the instrument's name.

If the current system is networked, then each station's name is listed in the left-most column. Also, if any crate instruments exist, they are listed to the left of the instrument name. Channels are listed within instrument names; the instrument is listed once for all of its channels.

2.1.8.3 Details
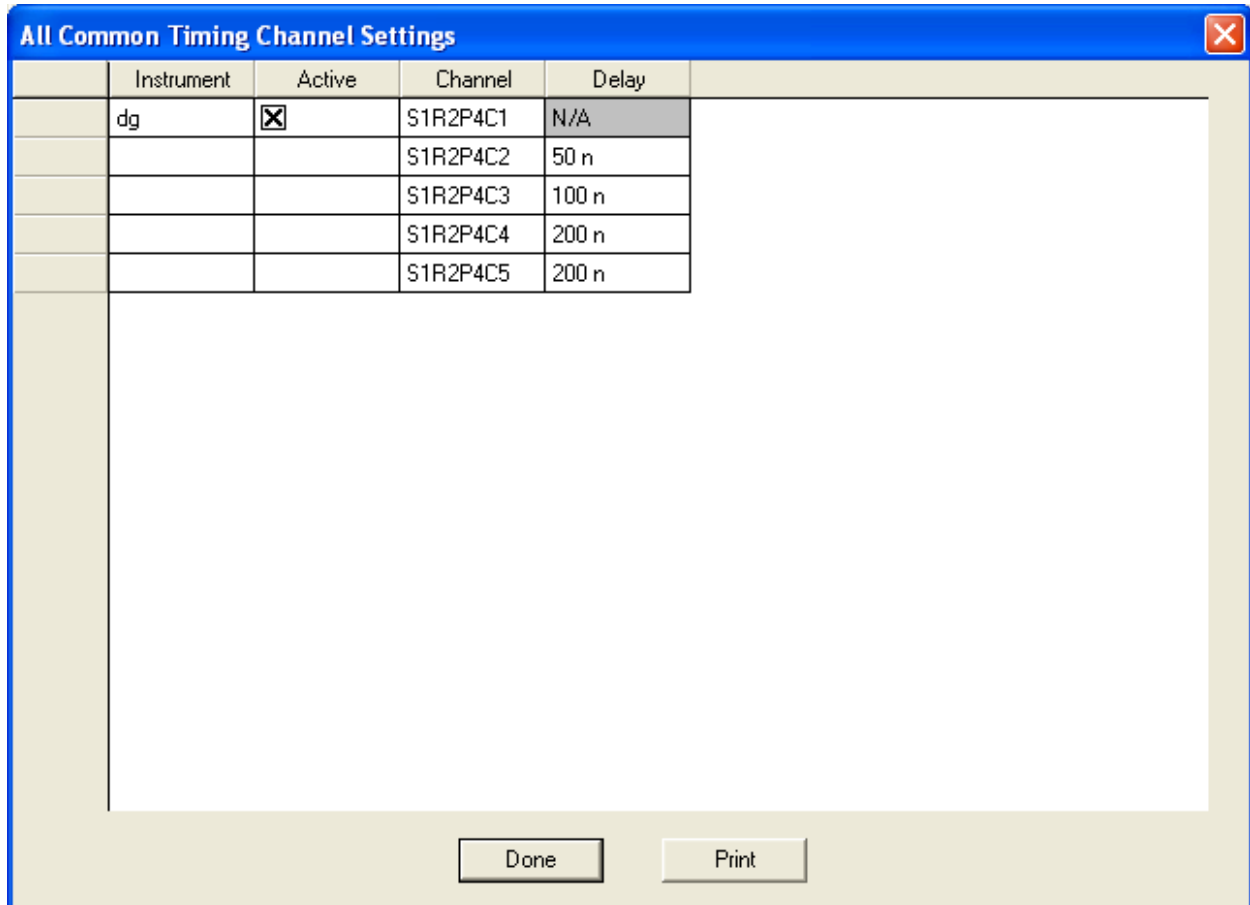
Item	Description
Station	For networked systems only, the station name is displayed in the far left column. If there are more than one station open, each station and all of its instruments are displayed with the station name.
Crate	If a crate exists (VXI or CAMAC), then the Crate column is to the left of the instrument column. Each instrument within the crate is then listed in the instrument column.
Instrument	Lists the instrument name. The instrument name is listed once for all channels; the first channel is listed on the same row as the instrument name. The name can be edited in place. Double-click the name to highlight it, then edit the name and press [Tab] to exit the field. The instrument's name must be unique and contain only valid characters. To activate the instrument's dialog, right click on the name. Changes made in this dialog are automatically updated in the map when OK is selected.
Active	When checked, the instrument is active.
Channel	The channel name for the instrument name last listed. The instrument's first channel is listed on the same row as the instrument. The name can be edited in place. Double click the name to highlight it, then edit the name and press [Tab] to exit the field. The channel name must be unique and contain only valid characters.
Active	When checked, the corresponding channel is active.
VFS	Allows adjustment of volts full scale on the selected channel if instrument supports this capability.
V Offset	Vertical offset for selected channel as a percentage of full scale.
Timebase	Digitization rate in samples / second.
Trigger Pos.	Trigger position in sec with acquired rec. A positive number implies pre-trigger.
Zero Base	
Auto Export 1	Auto export data from this channel to Auto Export path 1 when enabled in Global settings.
Export Type 1	Select format of exported data from a list of ASCII, DaDisp, DaDisp flat, and Dappen.
Auto Export 2	Auto export data from this channel to Auto Export path 2 when enabled in Global settings
Export Type 2	Select format of exported data from a list of ASCII, DaDisp, DaDisp flat, and Dappen.
Print	Prints the information that is displayed on the grid.

2.1.8.4 How Accessed

- Station Config->Instrument Settings

2.1.9 Timing Settings

2.1.9.1 Dialog

Figure 2-10 - Timing Settings Dialog

2.1.9.2 Discussion

The Timing Grid dialog displays all current timing instruments and their channels, and the timing delays for each. This grid is an efficient method for quickly viewing these settings, and can change them without activating the instrument's dialog.

Channels are listed within instrument names; the instrument is listed once for all of its channels. All fields may be edited in place. Unlike the Instrument Common Settings grid, the instrument's dialog cannot be activated from the grid.

2.1.9.3 Details

Item	Description
Instrument	Lists the instrument name. The instrument name is listed once for all channels; the first channel is listed on the same row as the instrument name. The name can be edited in place. Double click the name to highlight it, then edit the name and press [Tab] to exit the field. The instrument's name must be unique and contain only valid characters.
Active	When checked, the corresponding instrument is active.
Channel	The channel name for the last listed instrument. The name can be edited in place. Dou-

	ble click the name to highlight it, and then edit the name and press [Tab] to exit the field. The channel name must be unique and contain only valid characters.
Delay	The time delay for the channel. The delay can be edited in place. Double click the delay value to highlight it, and then edit it and press [Tab] to exit the field.
Print	Prints the information that is displayed on the grid.

2.1.9.4   How Accessed

- Station Config->Timing Settings

2.1.10   Global Settings

Global Settings is a tabbed dialog that is used to set the overall configuration of the DAAAC Acquire module. It can be accessed through the Acquire menu. It can also be configured to appear each time the ![GO] button is clicked. Each of the tabs is defined, here, independently.

2.1.10.1 Global Setting - General Configuration

2.1.10.1.1   Dialog
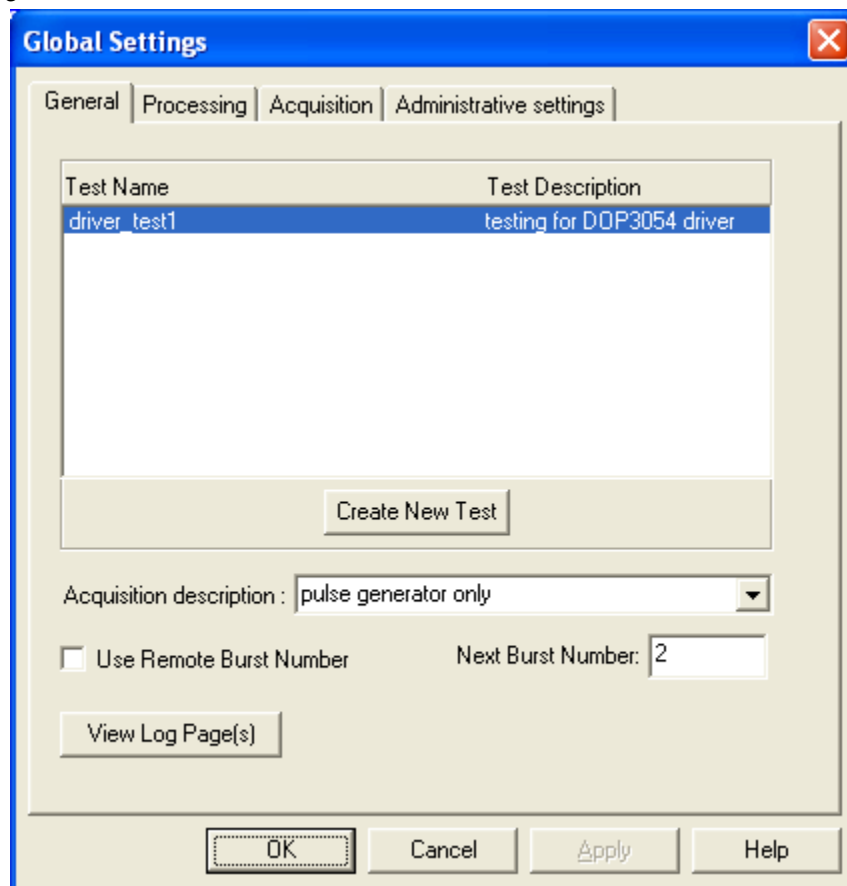
Figure 2-11 - Global Settings Dialog - General Configuration Tab

2.1.10.1.2   Discussion

The General page of the Global Settings dialog displays tests and descriptions, creates new tests, and configures settings related to shots for the currently selected test. This is the default page for

the Global Settings dialog, and is activated when the Get Waveforms, Global Settings, Go or Arm buttons are selected.

The Test Name and Description listing groups all system data, at the highest level, by test. The upcoming shot (burst) data can be associated with an existing test, or a new test can be created.

2.1.10.1.3 Details

Item	Description
Test Name and Description	Listing of previous and current test. The highlighted line selects the current test.
Create New Test	Activates the New Test dialog, used to enter test name and description. Each new test created with this function is then listed in the main window of this dialog.
Acquisition description	An optional descriptive string for the current acquisition.
Use Remote Shot Number	The shot (or burst) number is from a remote source, such as a DAAAC log, API software, or user-written software.
Next Shot Number	The shot (or burst) number to use for the next acquisition. The number is automatically incremented at the end of the acquisition sequence.
Log Page(s)	Display or edit the Log Page data. Log Pages contain user-defined test data and are optional.

2.1.10.1.4 How Accessed

- Acquisition->Acquisition Configuration
- On , if enabled.
- On

2.1.10.1.5 Create New Test

2.1.10.1.5.1 Dialog
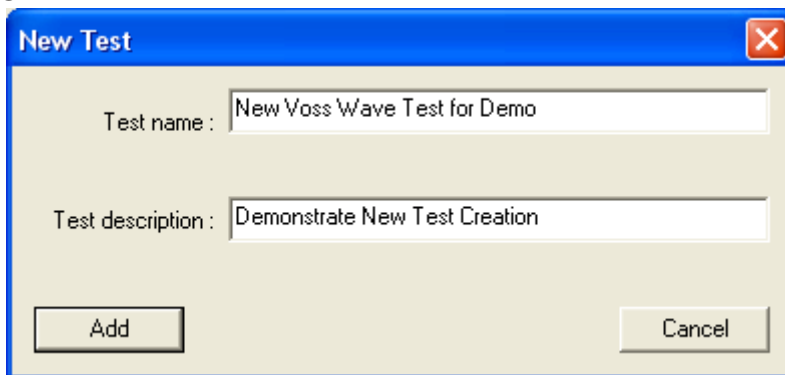
Figure 2-12 - Create a New Test

2.1.10.1.5.2 Discussion

This dialog is used to add a new test, by name, to the database. Along with the Test Name:, a more-detailed Test Description: may be provided. Acquisitions are organized, in the database, under named tests.

2.1.10.1.5.3Details

Item	Description
Test Name:	Unique identifier for the test. The test will be stored in the database under this name.
Test Description:	Text to provide detail regarding the purpose of creating this particular test.
Add	Add the test to the database by this name
Cancel	Close the dialog without updating the database.

2.1.10.1.5.4How Accessed

- Acquisition->Acquisition Configuration
- On [GO], if enabled.
- On [globe icon]

Then click Create New Test in the General dialog tab.

2.1.10.2   Processing

2.1.10.2.1   Dialog
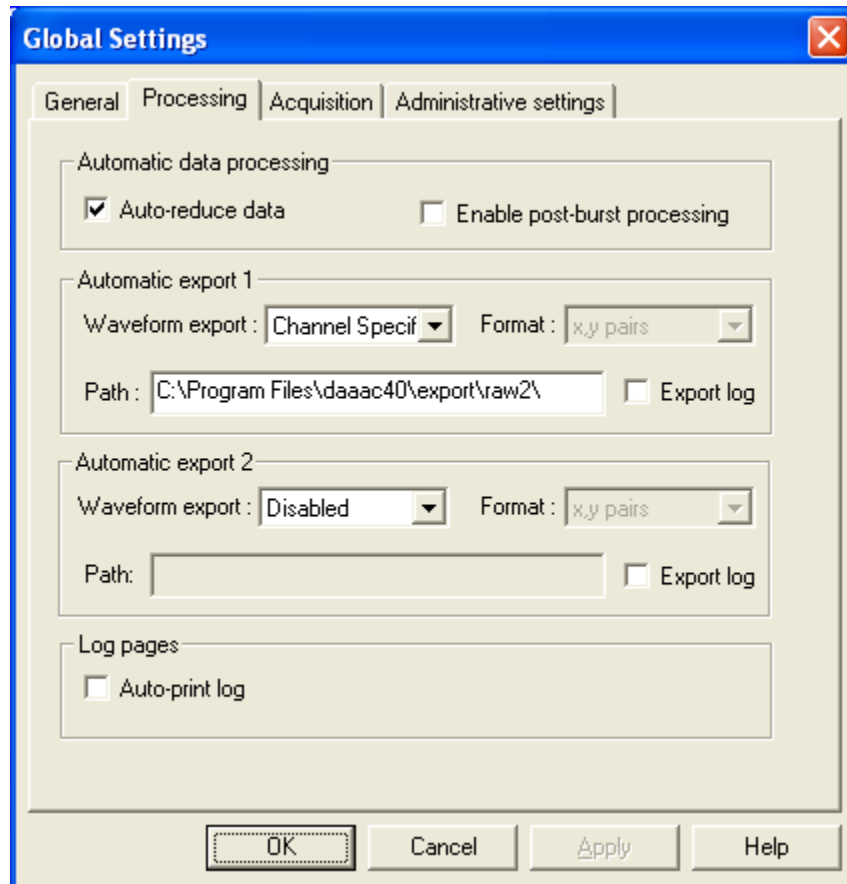
Figure 2-13 - Global Settings - Processing Configuration Tab

2.1.10.2.2 Discussion

The Processing page of the Global Settings dialog configures automated processing settings for the next shot, including data reduction and exports.

2.1.10.2.3 Details

Item	Description
Auto reduce data	If selected Acquire passes control to CalMan, following acquisition of raw data from the instruments, for automatic data reduction. If not selected, the reduction sequence can be initiated manually at any time from Analyze or CalMan.
Post-burst process	If selected, launches custom database processing that follows the main acquisition sequence. This is an optional feature.
Automatic Export 1 & 2	Supports automatic export of raw waveform data to two different locations and/or in two different formats.
Waveform export	Allows selection of channel specific export, global export (all raw waveforms), or no export.
Format	File format used if global export (all waveforms) is selected.
Path	Location for raw waveform export files.
Export Log	Export an ASCII representation of the Log Page data, if defined.
Auto-print Log	Print the associated Log Pages if any have been defined

2.1.10.2.4 How Accessed

- Acquisition->Acquisition Configuration
- On , if enabled.
- On

2.1.10.3 Acquisition

2.1.10.3.1 Dialog
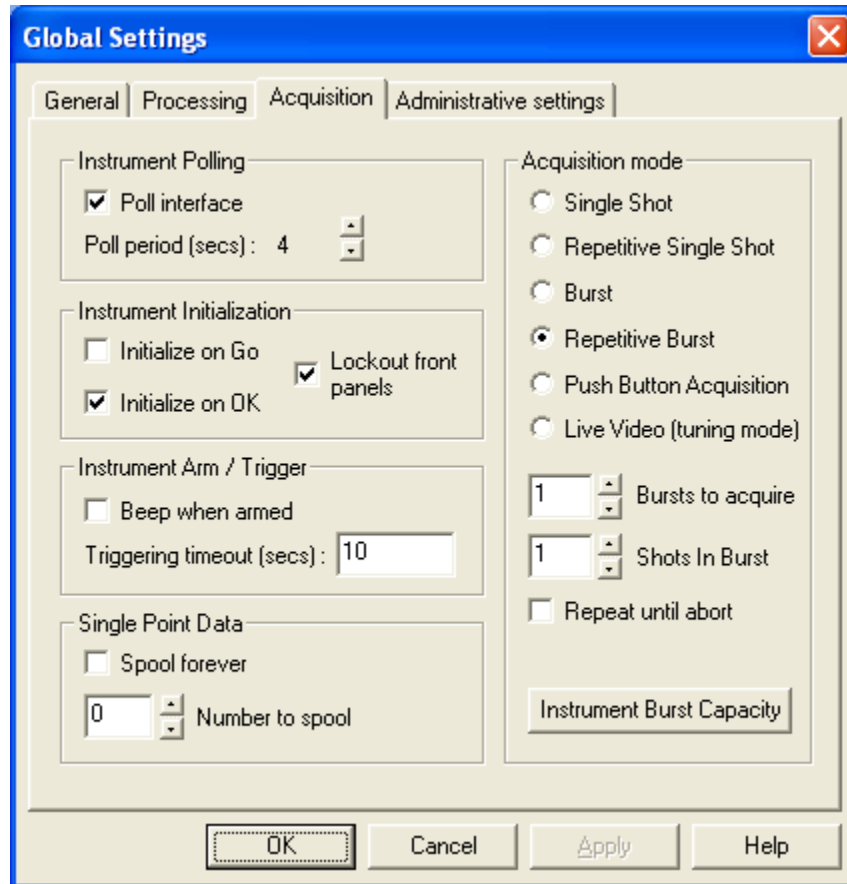
Figure 2-14 - Global Settings - Acquisition Configuration Tab

2.1.10.3.2 Discussion

The Acquisition page of the Global Settings dialog configures acquisition-related settings for the next shot. These settings include the acquisition mode (single shot, repetitive single shot, burst, repeated burst, live video, and push button acquisition), whether the instrument front-panels are locked out, whether instruments are initialized when OK is pressed in their main interface dialogs, and whether they are unconditionally initialized at the start of each acquisition. If an instruments front-panel is locked out, the instrument does not need to be initialized at the start of an acquisition. This saves significant time when the configuration includes instruments that are slow to initialize.

2.1.10.3.3 Details

Item	Description
Poll Interface	When checked, instruments are polled and their status is updated in the rack display. Polling occurs during idle times, and not during acquisition. This feature allows DAAAC to determine whether there is a device present, powered on, and connected at each address, and reduces the incidence of interface-related errors when communication is attempted with an instrument.

Poll Period	The time period between instrument polling commands.
Initialize on Go	When checked, all instruments are initialized (irregardless of their present status) when GO is selected.
Initialize on OK	When checked, the instrument is initialized when OK is selected from the instrument's dialog. The instrument dialog is activated by double-clicking the instrument icon in the rack.
Lock Out Front Panels	When checked, the panel on the instrument (the actual, physical device) is disabled.
Beep when armed	Causes the system to beep while armed, at an interval specified by the registry key HKLM\Software\VSI\\DAAAC\BeepPeriod.
Triggering Timeout	The number of seconds to wait for the remaining instruments to trigger, after the first instrument has triggered. A zero value causes DAAAC to continue polling for a trigger until all instruments are triggered, or until Stop or Force Trigger is selected.
Spool Forever	Allows the data from single point instruments (such as time interval meters) to be accumulated across many shots/bursts. Spooling allows for trend analysis and graphing at the analysis stations. If enabled, single point data from a given instrument channel is accumulated until the control is turned off.
Number to Spool	Number of single-point data points to spool. This setting overrides the number of shots in Repetitive Single Shot/Burst mode. Ignored if "Spool Forever" is checked.
Single Shot	The system expects a single shot and arms the instruments for a single trigger.
Repetitive Single Shot	The system arms the instruments for a single trigger, then repeats the entire acquisition sequence the specified number of times.
Burst	The system arms capable instruments for a burs of shots. The number of shots expected per burst is the number in the Shots in Burst field.
Repetitive Burst	The system arms instruments for a burst of shots, then repeats the entire acquisition sequence the specified number of times. The number of bursts expected is specified in the Bursts to Acquire field. The number of shots expected per burst is specified in the Shots in Burst field.
Live Video (tuning mode)	The system will open a window for each camera or fast digitizer channel device capable of presenting live data. No data is acquired or stored in database.
Push Button Acquisition	Used in conjunction with external trigger gating hardware. Allows the system to arm while placing cameras in live video mode. Upon the press of a button connected to external trigger gating hardware, the system reverts to the normal acquisition sequence and stores data from all triggered devices to the database normally. Allows multiple repetitions as with rep-single shot mode.
Shots/Bursts to Acquire	The number of shots or bursts for the current acquisition.
Shots in Burst	The number of shots per burst when in single or repetitive burst mode.
Repeat until abort	When checked, DAAAC acquires data repetitively until the STOP is selected. The Shots/Bursts fields are disabled.
Instrument Burst Capacity	Activates the Burst Capacity dialog, which displays the number of channels and the burst capacity for each instrument.
Auto Reduce Data	When checked, Acquire passes all acquired data, during the automatic acquisition sequence, to Cal Manager for computing automatic data reduction.

2.1.10.3.4 How Accessed

- Acquisition->Acquisition Configuration
- On ![GO], if enabled.
- On ![globe icon]

2.1.10.3.5   Burst Capabilities Dialog

2.1.10.3.5.1Dialog
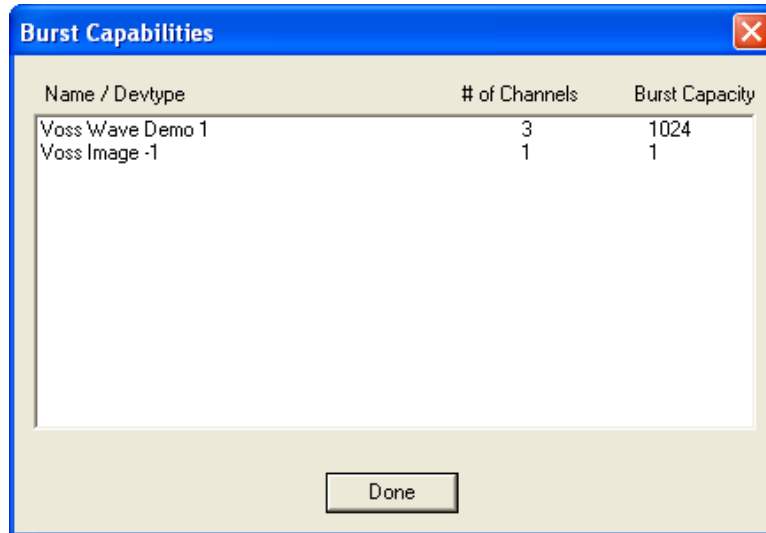
Figure 2-15 - Burst Capabilities of Attached Instruments

2.1.10.3.5.2Discussion

The Burst Capabilities dialog, activated from the Acquisition page of the Global Settings dialog, displays the number of channels and bursts per channel that each instrument in the current acquisition is capable of acquiring. Specifying a number of shots in a burst that exceeds an instrument's capacity is acceptable; the instrument will acquire as many waveforms as it can without ill effect. For example, if one of two instruments in the configuration can acquire 10 shots and the other can acquire two yet five shots are requested in the current burst, then the first instrument will return five waveforms for each enabled channel, and the second will return two. Some instrument manufacturers call burst capability by different names, such as Fast Frame and segmented memory. Burst capability is an optional DAAAC feature and may not be present.

2.1.10.3.5.3Details

Item	Description
Name/Devtype	Lists, by name, the attached instruments that are capable of capturing and returning burst data.
# of Channels	The number of independent data channels from which data may be captured from the instrument
Burst Capacity	The number of waveforms that can be captured and recalled, per channel, in a burst.
Done	Dismiss the dialog

2.1.10.3.5.4How Accessed

- Acquisition->Acquisition Configuration or 🟢, if enabled or 🌐. Then select the Acquisition tab in the Global Settings dialog. Select one of the burst acquisition modes, enabling the Instrument Burst Capacity button. Click the button to open the Burst Capabilities dialog.

2.1.10.4   Administrative Settings

2.1.10.4.1   Dialog
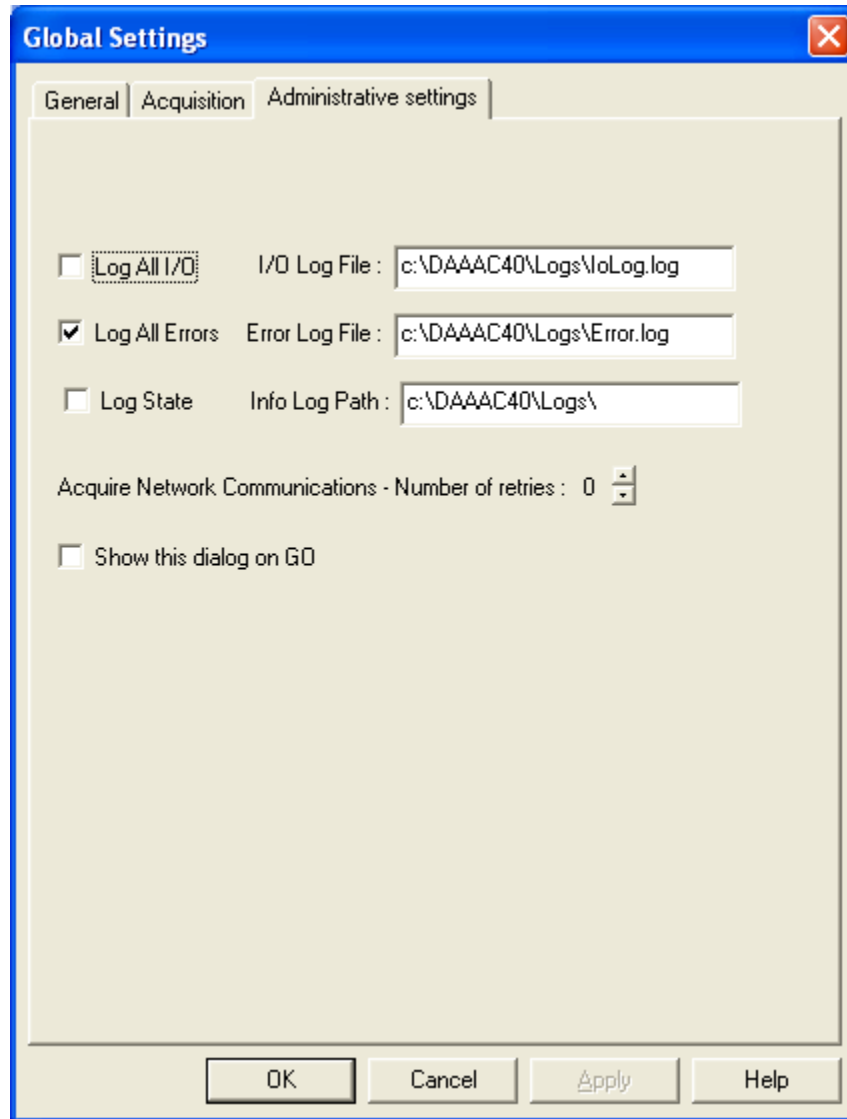
Figure 2-16 - Global Settings - Administrative Settings Tab

2.1.10.4.2   Discussion

The Administrative page of the Global Settings dialog defines I/O, error, and diagnostic names and paths, and several other administrative options.

2.1.10.4.3   Details

Item	Description
Log All I/O	When checked, all I/O data is sent to the file named in the I/O Log File field. I/O should not be logged except for debugging purposes. The I/O Log file can grow very large quickly so this feature should normally be disabled.
I/O Log File	The full path and name for the I/O log file..
Log All Errors	When checked, all system errors are sent the file named in the Error Log File. Errors

	should be logged only under unusual circumstances.
Error Log File	Full path name for the error log. The Error Log file is named Error.log by default.
Log State	When checked, diagnostic messages are sent to the file named in the Info Log Path. Log State is also used for debugging purposes and system tuning. It generates a file containing time stamped records of all state transitions in the system (e.g. initializing, arming, etc.). The InfoLogPath specifies the location of these log.
Info Log Path	The full path for the log state file. The files are according to the current date, and are formatted as YYYYMMDD.Inf, where YYYY is the four digit year, MM is the month, and DD is the day.
Acquire Network Communications - Number of retries	The number of times to try to re-connect to a remote network station if communications is lost. The default is four, which requires a total of eight minutes. This value may be changed to suit current circumstances.
Show this dialog on GO	on GO When checked, the General page of the Global Settings dialog is displayed when the Go button is selected. This allows changes to be made for each shot (test name, shot numbering, etc.).

2.1.10.4.4   How Accessed

- Acquisition->Administrative Settings
- On , if enabled.
- On

2.1.11   Gang Calibrate

2.1.11.1   Dialog
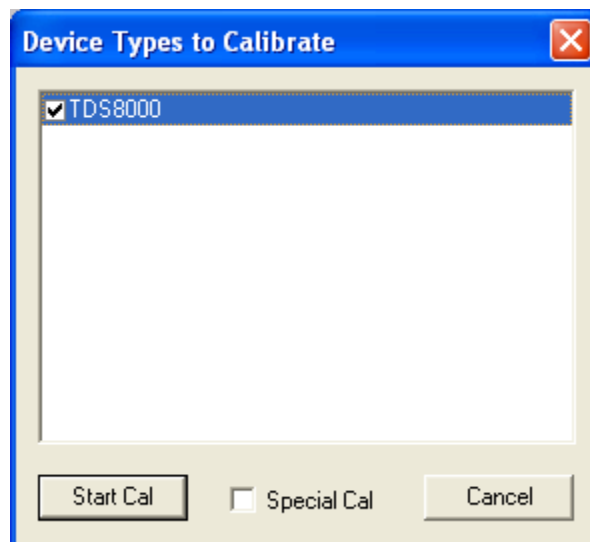
Figure 2-17 - Gang Calibration Selection

2.1.11.2   Discussion

Gang Calibrate All activates the Gang Calibrate Selection dialog. It calibrates all selected, available, and active instruments that support internal calibration. The dialog list represents all instruments in the current configuration that can be calibrated internally. Any checked instruments

of the indicated type will be calibrated in parallel when Start Cal is selected. For networked systems, only the current Test Director may perform ganged calibrations on remote station's instruments.

2.1.11.3 Details

Item	Description
List	The list of instruments includes all instruments in the current configuration that can be signaled to self-calibrate. Checking or unchecking the boxes next to the instruments selects or deselects the instruments for calibration.
Start Cal	Signal all selected instruments to calibrate themselves
Special Cal	

2.1.11.4 How Accessed

- Tools->Gang Calibrate All.

2.1.12 User Security

2.1.12.1 Dialog
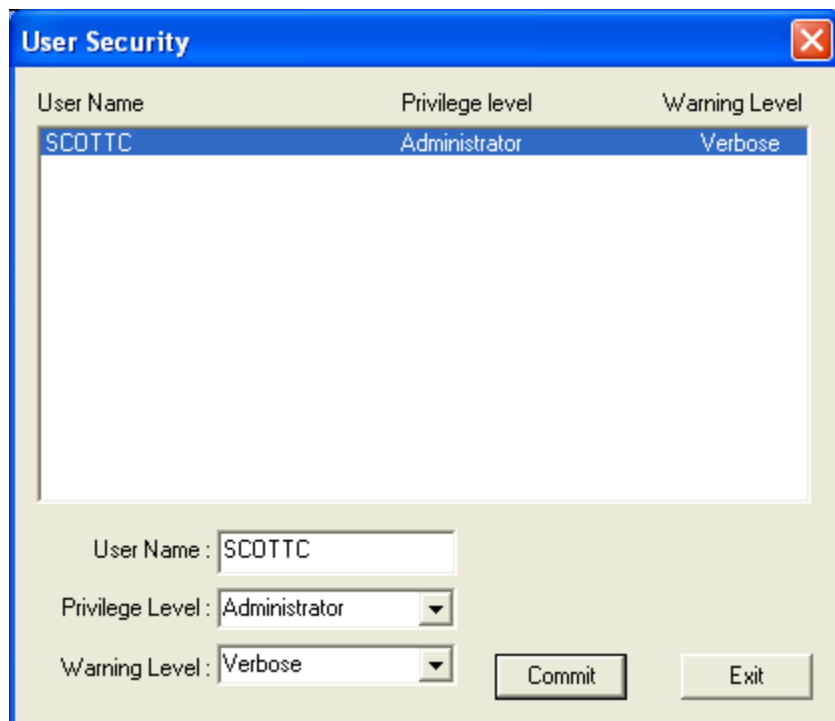
Figure 2-18 - Manage Users

2.1.12.2 Discussion

Note: THIS FUNCTION IS DEPRECATED. AT PRESENT ALL USERS ARE ADMINISTRATORS BY DEFAULT

The User Security dialog maintians the user privilege and warning levels. This command is available only to those Administrator security levels. To add users, type the login name in the User Name field, select a privilege and warning level, then select Commit. To modify an existing

account, select the account name in the list box, make the changes, then choose Commit to save the changes to the database.

2.1.12.3 Details

Item	Description
List Box	Lists all user names and security attributes.
User Name	The name of a user or a group of users, such as Admin or Group A. The user name is the same as the operating system Login Name, but all letters are capitalized.
Privilege Level	The level of authority given to the named user. Novice users may change instrument settings or certain Global Settings, and may start an acquisition only. Expert users have full system authority but may not become Test Director. Power Users can become Test Director, and run Gang Cals. Administrators can change user levels, add to the inventory, and perform any other function.
Warning Level	The warning statement type that is logged in the error log.
Commit	Saves the currently selected security attributes. Commit can not be undone. Once Commit is selected, the security attributes are saved to the database and can only be re-edited.
Exit	Dismisses the dialog.

2.1.12.4 How Accessed

- *Deprecated – Not Available*

2.1.13 Notebook

2.1.13.1 Main Dialog

2.1.13.1.1 Dialog

Figure 2-19 - Notebook Inventory Dialog

2.1.13.1.2 Discussion and Detail

Please see the Main Manual, Section 3.7 for a complete description of the Notebook tool.

2.1.13.1.3 How Accessed

- Tools->Notebook

2.1.13.2 Edit Dialog

2.1.13.2.1 Dialog
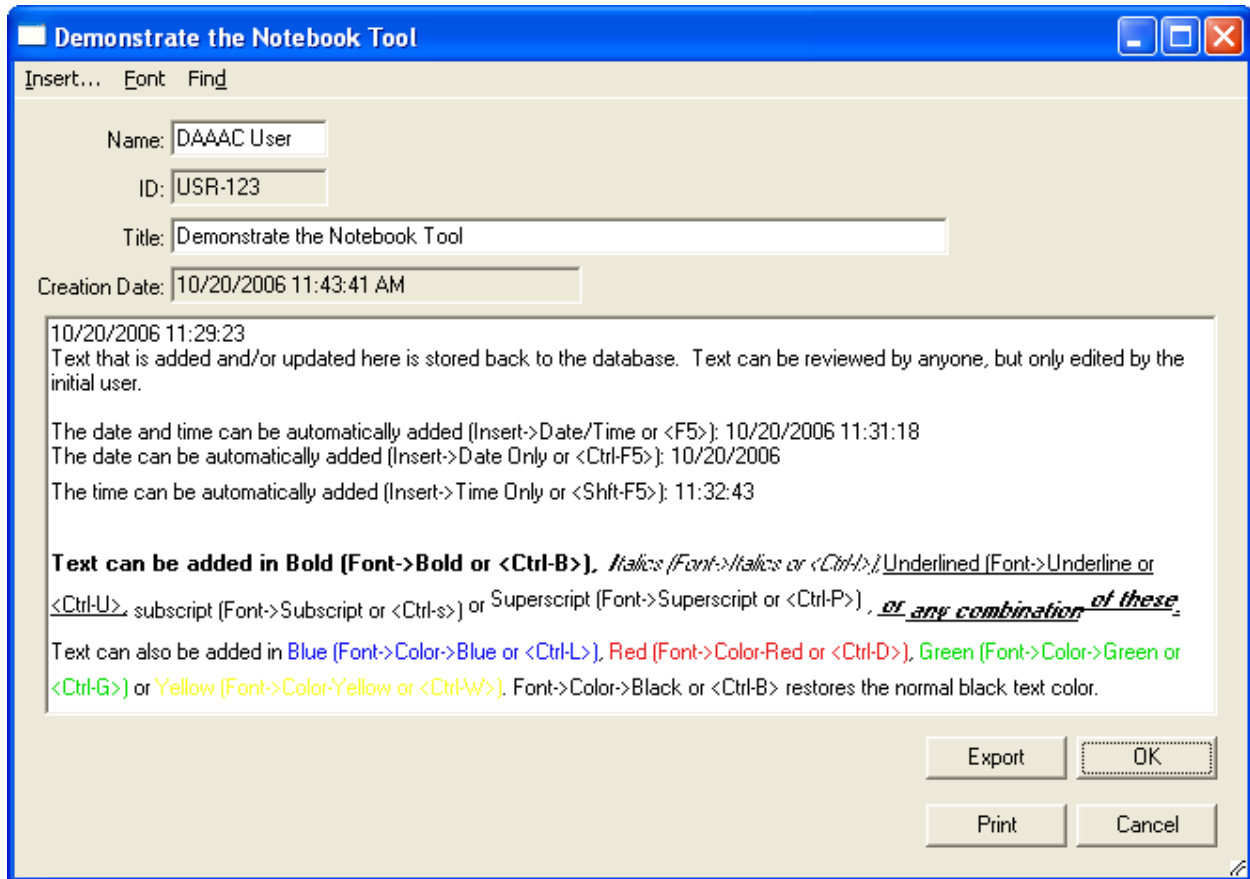
Figure 2-20 - Notebook Editing Window

2.1.13.2.2 Discussion and Detail

Please see the Main Manual, Section 3.7 for a complete description of the Notebook tool.

2.1.13.2.3 How Accessed

- Tools->Notebook

2.1.14 Generate Performance Report

2.1.14.1 Dialog
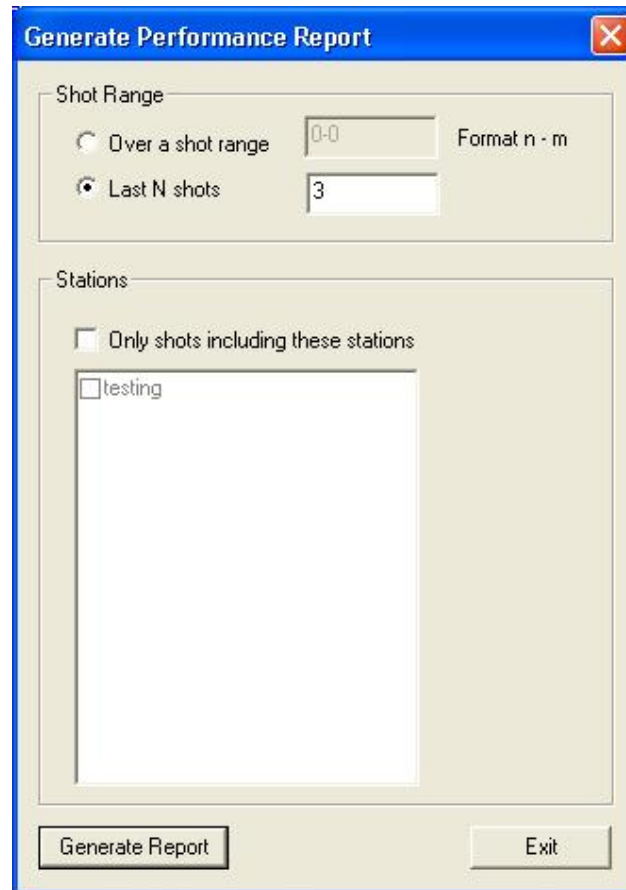
Figure 2-21 - Generate Performance Report Dialog

2.1.14.2 Discussion

Displays the Generate Performance Report selection dialog. This dialog allows the operator to limit the report to a user-specified number of shots and or stations. Once Generate Report is selected a report will be generated directly in the users already-installed copy of Microsoft Excel. If Excel is not installed an error will be issued. The report contains the information specified when performance monitoring was configured. It is primarily used to monitor the health of very large installations or facilities. This is a keyed feature and not present in most installations.

2.1.14.3 Detail

2.1.14.4 How Accessed

- DataView->Performance Report

2.1.15 Get Data Specification

2.1.15.1 Dialog
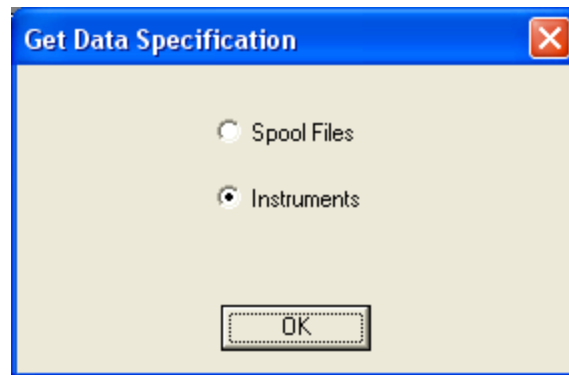
Figure 2-22 - Data Specification Dialog

2.1.15.2 Discussion

The Get Data Specification dialog is activated after Get Waveforms is selected. It selects the source for the data, either Spool Files or Instruments.

When OK is selected, the data is read from the selected source. Note that the Get Data Specifications dialog does not appear when Get Waveforms is clicked as part of the normal manual execution sequence.

2.1.15.3 Details

Item	Description
Spool Files	Primarily intended for disaster recovery if the computer or DAAAC fails while reading data from the instruments. Data is stored on the local computer in spool files. This data may be recovered by restarting the computer (or software) if necessary, and selecting Get Waveforms, then Spool Files from the resulting dialog.
Instruments	The data is read directly from the instruments.

2.1.15.4 How Accessed

-

2.1.16 Info.txt

2.1.16.1 Current Info.txt

2.1.16.1.1 Dialog
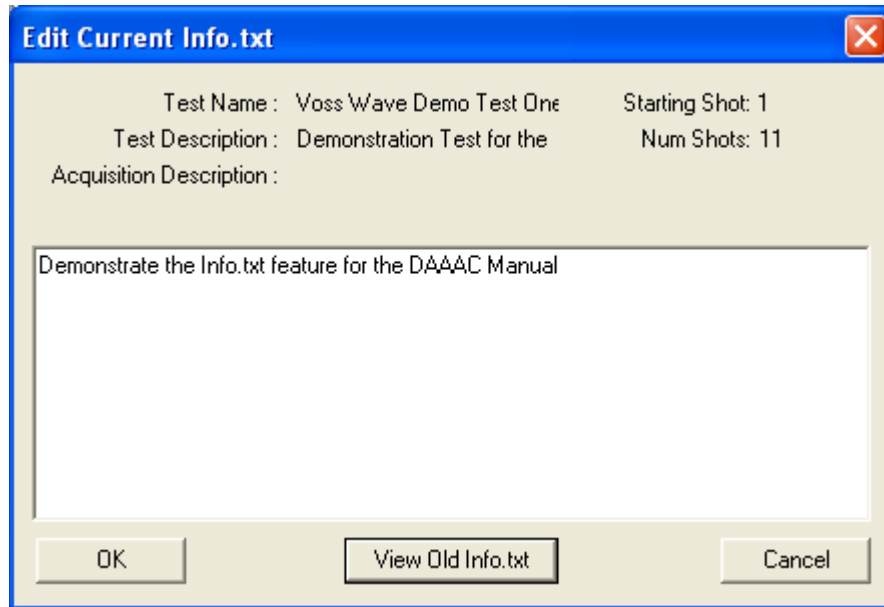
Figure 2-23 - Edit Info.txt for the Current Test

2.1.16.1.2 Discussion

Display/Edit Info.txt activates the Edit Info.txt dialog, which displays the current information record for the current Test. A new information record is created for each new test.

2.1.16.1.3 Details

Item	Description
Test Name	Displays the first 39 characters of the Test Name.
Test Description	Displays the first 39 characters of the Test Description.
Acquisition Description	Displays the first 39 characters of the Acquisition Description.
Starting Shot	Displays the first shot number for this test.
Num Shots	Displays the total number of shots for this test.
Comment field (not labeled)	Comments up to 1024 characters.
View Old Info.txt	Activates the Info.txt Select dialog, used for viewing old test records, which are created when new tests are defined.

2.1.16.1.4 How Accessed

-

2.1.16.2 Info.txt Select

2.1.16.2.1 Dialog
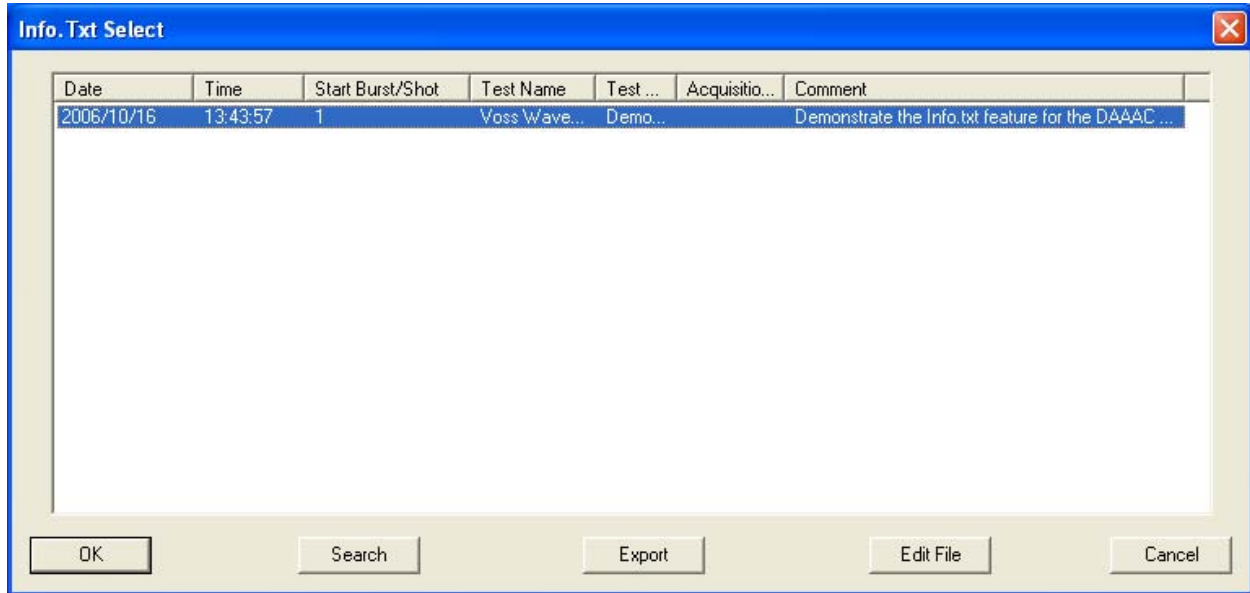
Figure 2-24 - View Other Test Entries

2.1.16.2.2 Discussion

The Info.Txt Select dialog lists the Info.txt record for all of the tests assigned to the active database. The entries can be exported to text or Excel-formatted files. Once exported, the text file may be opened for editing. The set of test records may be searched for specified values within the list of stored parameters as discussed in 2.1.16.3.

2.1.16.2.3 Details
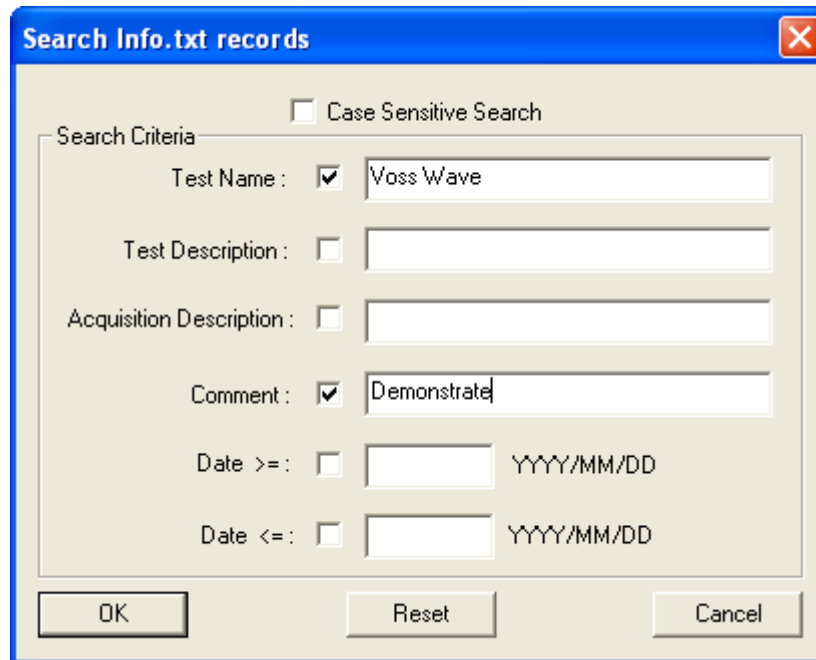
Item	Description
Date	Date that the test was first executed
Time	Time that the test was first executed
Start Burst/Shot	Displays the first shot number for this test.
Test Name	Displays the first 39 characters of the Test Name.
Test Description	Displays the first 39 characters of the Test Description.
Acquisition Description	Displays the first 39 characters of the Acquisition Description.
Comment field	Comments up to 1024 characters.
Search	Opens the dialog of 2.1.16.3.1, allowing the list of test entries to be searched for specified values in the various fields.
Export	Opens a standard Windows file browser dialog. The dialog may be used to navigate to a folder and assign a name to a text or Excel file to which the Info.txt information will be written.
Edit File	Opens a standard Windows file browser dialog. The dialog may be used to navigate to a previously exported text-formatted Info.txt file. The file will be opened in the default *.txt file editor program to allow adjustment.

2.1.16.2.4 How Accessed

- , then click View Old Info.txt of Figure 2-23 to open the dialog of Figure 2-24.

2.1.16.3 Search Info.txt

2.1.16.3.1 Dialog

Figure 2-25 - Info.txt Search Dialog

2.1.16.3.2 Discussion

Search Info.txt looks for the Info.txt record that contains the search criteria. Search criteria may include date range, individual words, or text strings in any portion of the record. Words or text strings may be an exact match (with or without case sensitivity) or any subset. The characters or words entered in a search box must occur as a sub-string in the specific field for a match to occur.

2.1.16.3.3 Details

Item	Description
Case Sensitive Search	When checked, the text in the selected search field(s) must match the search text exactly. When unchecked, character strings that match the search strings, regardless of the case (upper or lower) of the various characters in the search fields.
Test Name:	When checked, the Test Name field in the Info.txt records will be searched for the specified text.
Test Description:	When checked, the Test Description field in the Info.txt records will be searched for the specified text.
Acquisition Description:	When checked, the Acquisition Description field in the Info.txt records will be searched for the specified text.
Comment:	When checked, the Comment field in the Info.txt records will be searched for the specified text.

Date >=:	When checked, only records whose Date field is at or later than the time specified will be selected..
Date <=:	When checked, only records whose Date field is at or earlier than the time specified will be selected.
Reset	Clear all fields and uncheck all boxes.

2.1.16.3.4 How Accessed

- , then click View Old Info.txt of Figure 2-23 to open the dialog of Figure 2-24. Finally, click Search to open the Figure 2-25 dialog.

2.1.17 Acquire Properties

2.1.17.1 Station Properties

2.1.17.1.1 Dialog
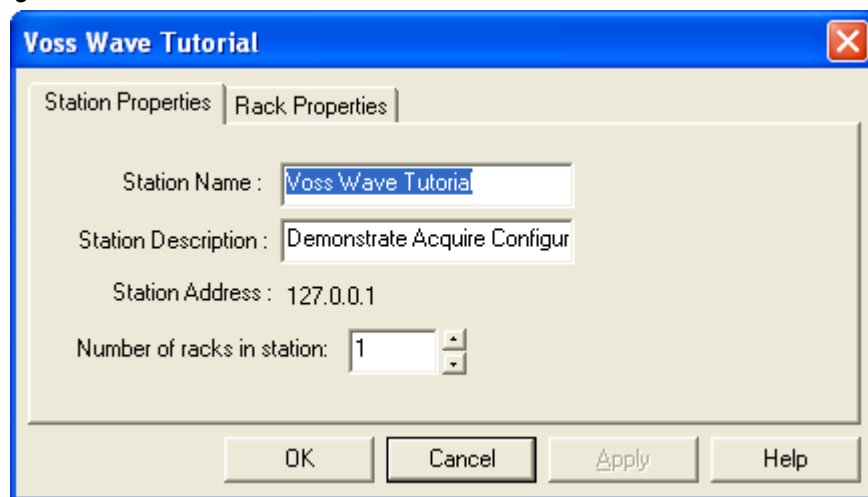
Figure 2-26 - Acquire Station Properties

2.1.17.1.2 Discussion

The Station Properties dialog is used to review and reconfigure the settings of the current station.

2.1.17.1.3 Details

Item	Description
Station Name:	Unique Identifier for the current station.
Station Description:	Details about the station
Station Address:	Read Only. The IP Address of the station being reviewed. 127.0.0.1 always indicates the local host and will always represent a standalone system.
Number of racks in station:	The number of vertical collections in the station. This number can be increased, but never decreased, using this control.

2.1.17.1.4 How Accessed

- Right-click outside of a rack in the station window, and then select Properties from the popup menu.

2.1.17.2 Rack Properties

2.1.17.2.1 Dialog
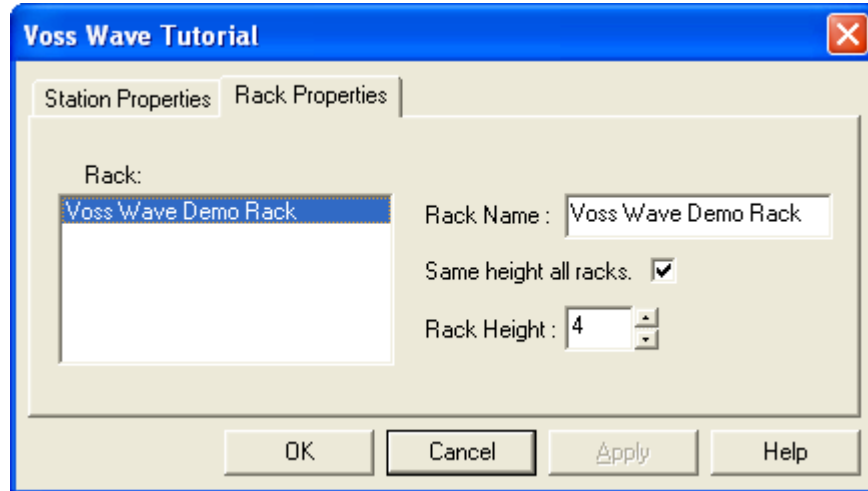
Figure 2-27 - Acquire Rack Properties

2.1.17.2.2 Discussion

The Rack Properties dialog is used to review and reconfigure the settings of the various racks within a station.

2.1.17.2.3 Details

Item	Description
Rack:	Lists, by name, all the racks in the station. Use this list to select a particular rack for review and/or updating.
Rack Name:	Unique identifier for the rack.
Same height all racks:	Checking this control causes all of the racks in the system to take on a height that will accommodate the number of instruments that the tallest rack can accept.
Rack Height:	Adjust the number of instruments that can be assigned to a rack. This number may be increased, but never decreased, using this control.

2.1.17.2.4 How Accessed

- Right-click outside of a rack in the station window, and then select Properties from the popup menu.

2.1.18 Trigger Time Channels

2.1.18.1 Dialog
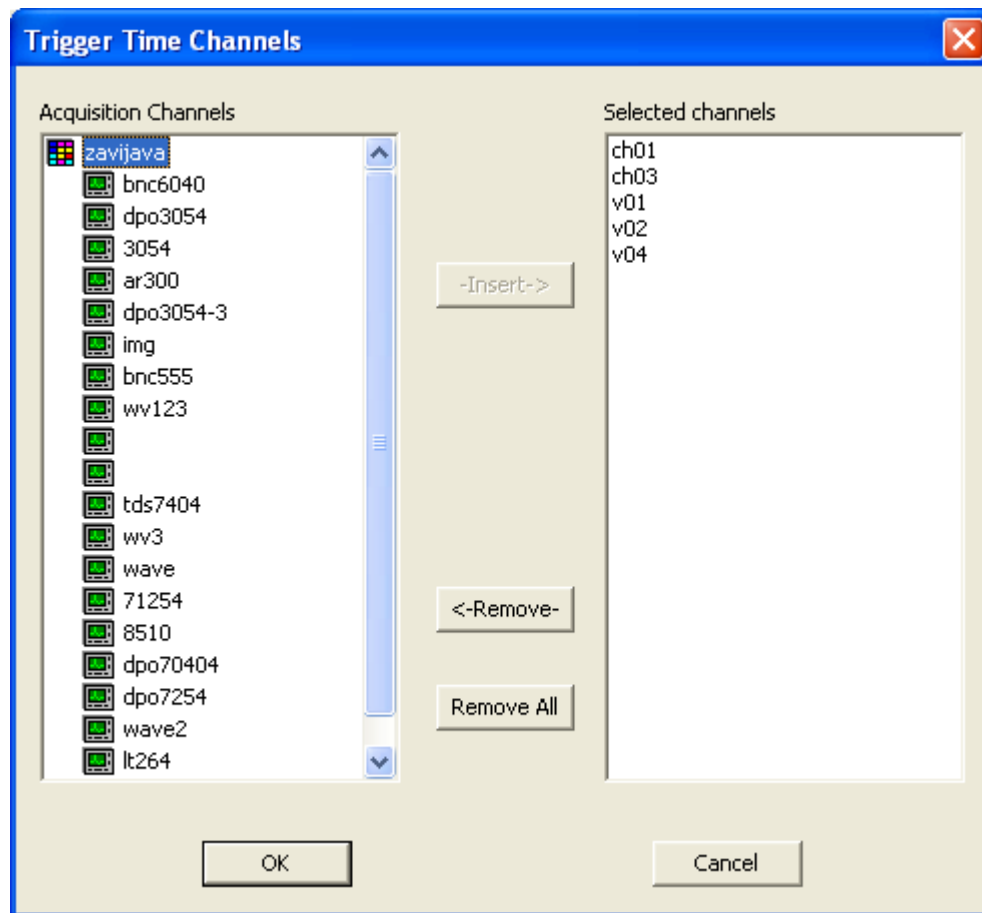
Figure 2-28 – Trigger Time Channels Dialog

2.1.18.2 Discussion

The Trigger Time Channels dialog is used to selects channels for trigger time calculation and transmission. Trigger times are defined as the difference in time between the initial trigger pulse (t_0) and the waveform time at 50% of the peak amplitude (t_1). The time is calculated as $t = (t_1 - t_0)$ − the associated cable transmission delay. Trigger time values for all selected channels are transmitted in response to the *Timing_Data?* command from a TCP socket client application (see Section 4.2, Acquire TCP Socket Interface).

Note: trigger time data is generated by DAAAC's CalMan module during the data reduction process. If no data is acquired or if a cal line does not exist for a selected trigger time channel, the reported time value for that channel will be 0. If none of the selected trigger time channels have cal lines, the reported shot number will also be 0.

This is a keyed feature.

2.1.18.3   Details

Item	Description
Acquisition channels	A list of all installed instrument channels. Clicking on an instrument displays that instruments channels.
Selected channels	A list of channels selected for trigger time calculation and transmission.
Insert	Moves the selected channel from the Acquisition channel list to the Selected channel list.
Remove	Returns the selected channel to the Acquisition channel list from the Selected channel list.
Remove All	Returns all selected channels to the Acquisition channel list.

2.1.18.4   How Accessed

- Station Config -> Trigger Time Channels
-

2.2   Archive Dialogs

2.2.1   View Waveforms

2.2.1.1   Dialog
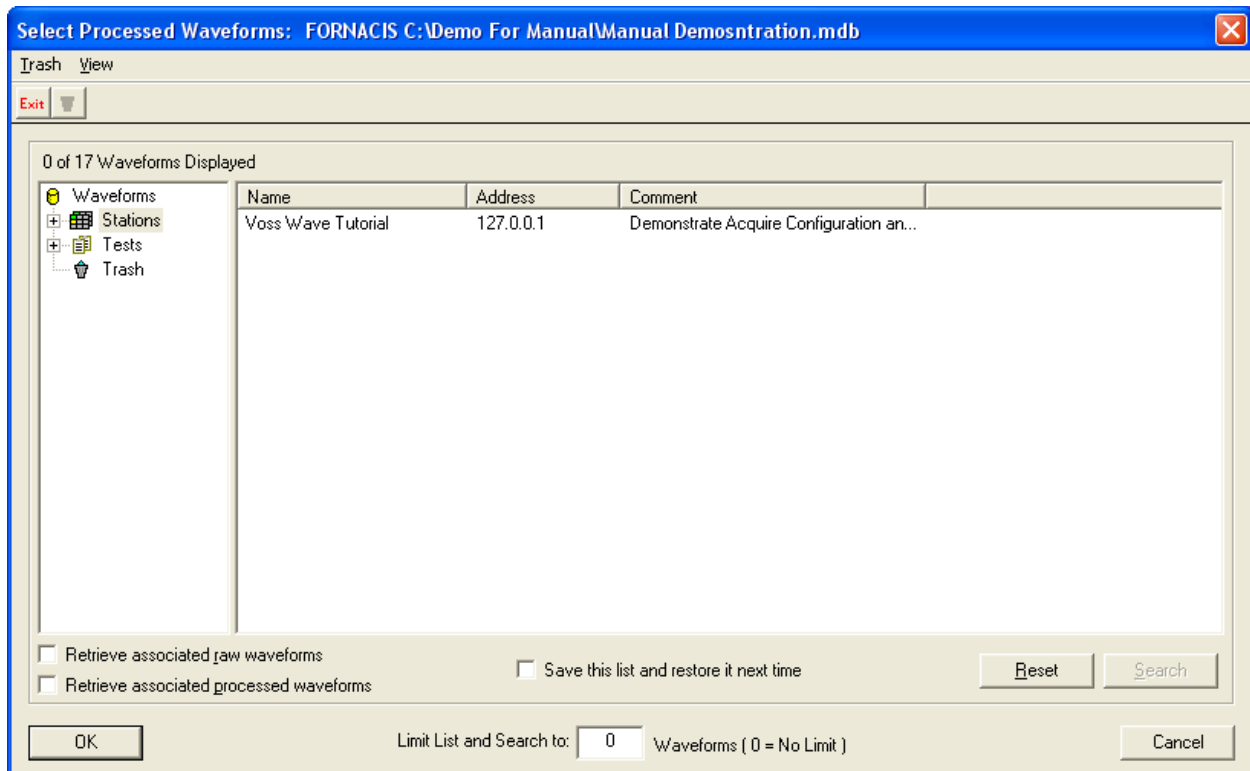
Figure 2-29 - View Waveforms Dialog

2.2.1.2 Discussion

The View Waveforms dialog is displayed when selecting raw or processed waveforms. It also is used to delete waveforms from the database. For example, it can open the waveforms for editing in Analyze, or it can select a waveform as a Cal Item in Cal Manager. The left pane contains categories such as Station, Test and Trash. Click the + and - to expand and contract the directory display for each category. Selecting a station or test from the left pane displays all waveforms and images associated with the selected item. Selecting Waveforms from the left pane displays all waveforms in the database. Selecting Trash from the left pane displays all deleted waveforms The right pane contains the property data for each waveform that is displayed. Note that the dialog displays either raw or processed data, but not both simultaneously.

2.2.1.3 Details

Item	Description
Trash Menu	Options for removing waveforms from the database.
Delete Waveforms (Trash menu)	Removes all currently selected waveforms from the database. When waveforms are first deleted, they are only tagged as deleted and not displayed in the waveform list, but they remain in the database. They are not permanently removed from the database until Empty Trash is selected. A dialog is then displayed asking if associated waveforms (raw if deleting processed, and processed if deleting raw) are also to be removed. When Yes is selected, the waveforms are permanently removed from the database. When Empty Trash is selected, all waveforms in the trash are permanently removed from the database and cannot ever be recovered.
Recover (Trash menu)	Deleted waveforms that have not been deleted with Trash can be recovered. To recover deleted waveforms, they must be displayed in the list. Double-click the Trash icon in the left pane. Select those to recover from the list, and then select Recover Waveforms from the Trash menu. A dialog is displayed asking if associated waveforms (raw if recovering processed, and processed if you are recovering raw) also should be recovered. If Yes is selected, the associated waveform is recovered and again available for use.
Empty (Trash menu)	When selected, all waveforms in the Trash are permanently removed. Warning! Empty Trash permanently removes these waveforms from the database. They cannot be recovered.
View Trashed Waveforms (View menu)	When selected, View fills the waveform list with all waveforms queued for deletion.
Select Data Types (menu)	Available only when retrieving raw waveforms, Select Data Types limits the type of data to Waveform and/or Single point and/or Image. The toolbar below the menu contains buttons corresponding to Waveform, Single point, and Image.
Retrieve associated processed waveforms	Available when retrieving both raw and processed waveforms. When checked, any processed waveforms linked to raw waveforms are also retrieved. The associated processed waveforms are not displayed in the list, but are available to the application using this dialog. This has no effect when only viewing waveforms (such as when this dialog is activated from Archive).
Save this list and restore it next time	By default, no waveforms are displayed in the waveform list until an item is selected from the left pane. Select Save this list… to remember the list of displayed waveforms when the dialog is closed, and then display that list the next time the dialog is opened.
Limit List	This limits the number of waveforms, displayed in the list, to the number entered in

Search	this field. Only the first N (where N is the number entered into this field) waveforms retrieved from the database are displayed. Enter '0' to display all waveforms.
Reset	This resets (updates) the list of waveforms.
Search	This activates a dialog used for searching the current list of waveforms.

2.2.1.4 How Accessed

- Archive: File->Export Waveforms
- Archive: Data View->Raw Waveforms…
- Archive: Data View->Processed Waveform…
- (Archive)
- CalMan->Reductions->Off-line Reduction

2.2.2 Waveform Import – Step 1 – Set Data Start and End Points

2.2.2.1 Dialog
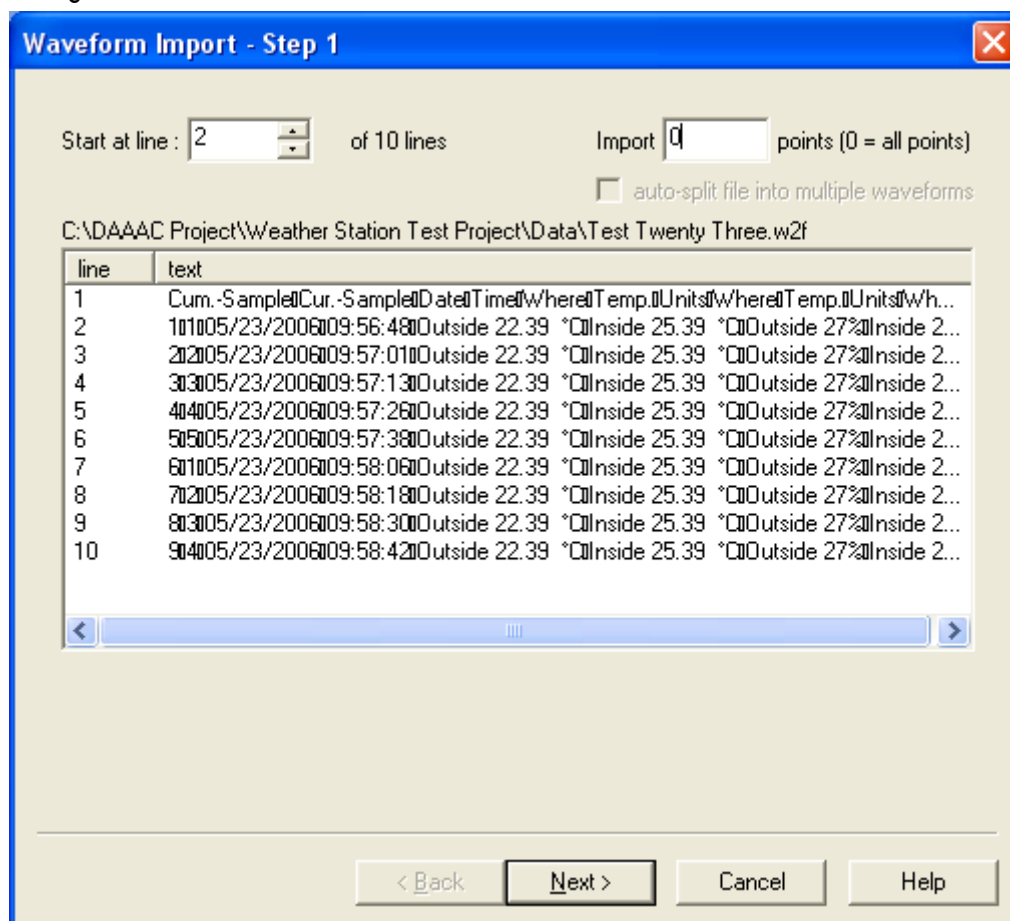
Figure 2-30 - Waveform Import Dialog 1

2.2.2.2 Discussion

Collimated, tabular ASCII data that is delimited by tabs, spaces, commas, semi-colons or any other single character may be imported as waveforms into DAAAC. The process begins by selecting the import waveform in a standard Windows browser dialog. Once selected, the data appears in a dialog as in Figure 2-30. This is the first step in defining the data that is to be imported. The dialog specifies the data start point (vertically in the list) and the number of sequential points to include in the waveform including the option to simply read to the end of the file.

2.2.2.3 Details

Item	Description
Start at line:___ of *X* lines.	Indicates which line number in the input file is to serve as the first data point in the waveform. Note that in the example of Figure 2-30, the first line is a header that should not be included in the data list.
Import __ points	Indicates the total number of sample points, including the first point, that are to be read from the file to form the imported waveform. '0' in this entry will cause all file points from the start point to be imported.
line	Line number in the imported file.
Text	The text read from the file. At this point the file has only been segmented into lines.

2.2.2.4 How Accessed

- File->Import Waveforms…

2.2.3 Import Waveform – Step 2 – Set Delimiters

2.2.3.1 Dialog
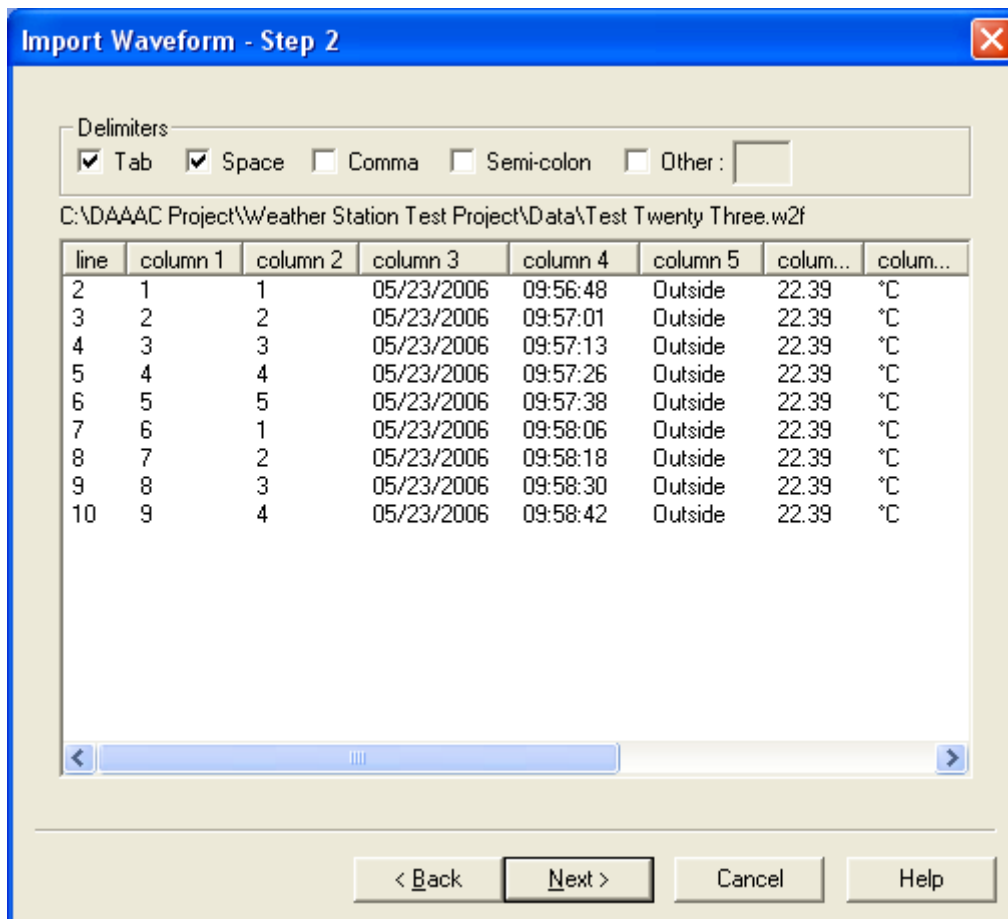
Figure 2-31 - Waveform Import Step 2

2.2.3.2 Discussion

Once an import file has been selected and the starting point and number of points to extract have been determined as in 2.2.2, clicking Next > produces the dialog of Figure 2-31. Here the input data has been subsampled to show only those data points that are indicated in step 1. The data is also divided into columns based on the selected delimiters. The data columns can be adjusted by selecting and deselecting delimiters until the data is properly formatted. In addition to the standard Tab, Space, Comma and Semi-colon delimiters, any single character can be specified as a delimiter by checking Other: and entering the character into the control.

2.2.3.3 Details

Item	Description
Tab	If checked, every instance of a tab character in the text line will separate the remaining line into columns. If unchecked, tabs are considered part of the text and one or more may be included in a single column.
Space	If checked, every instance of a space character in the text line will separate the remaining line into columns. If unchecked, spaces are considered part of the text and

	one or more may be included in a single column.
Comma	If checked, every instance of a comma in the text line will separate the remaining line into columns. If unchecked, commas are considered part of the text and one or more may be included in a single column.
Semi-colon	If checked, every instance of a semi-colon in the text line will separate the remaining line into columns. If unchecked, semi-colons are considered part of the text and one or more may be included in a single column.
Other	If checked, every instance of the character specified in the text control occurring in the text line will separate the remaining line into columns. If unchecked, no custom characters are considered part of the text. Checking this control enables the unlabeled text control
line	Line number in the imported file.
column *N*	The columnar separation of the lines based on the current selection of delimiters. This field will adjust itself as delimiter types are checked and/or unchecked.

2.2.3.4   How Accessed

- File->Import Waveforms…

2.2.4   Import Waveform – Step 3 – Set Data Columns

2.2.4.1   Dialog
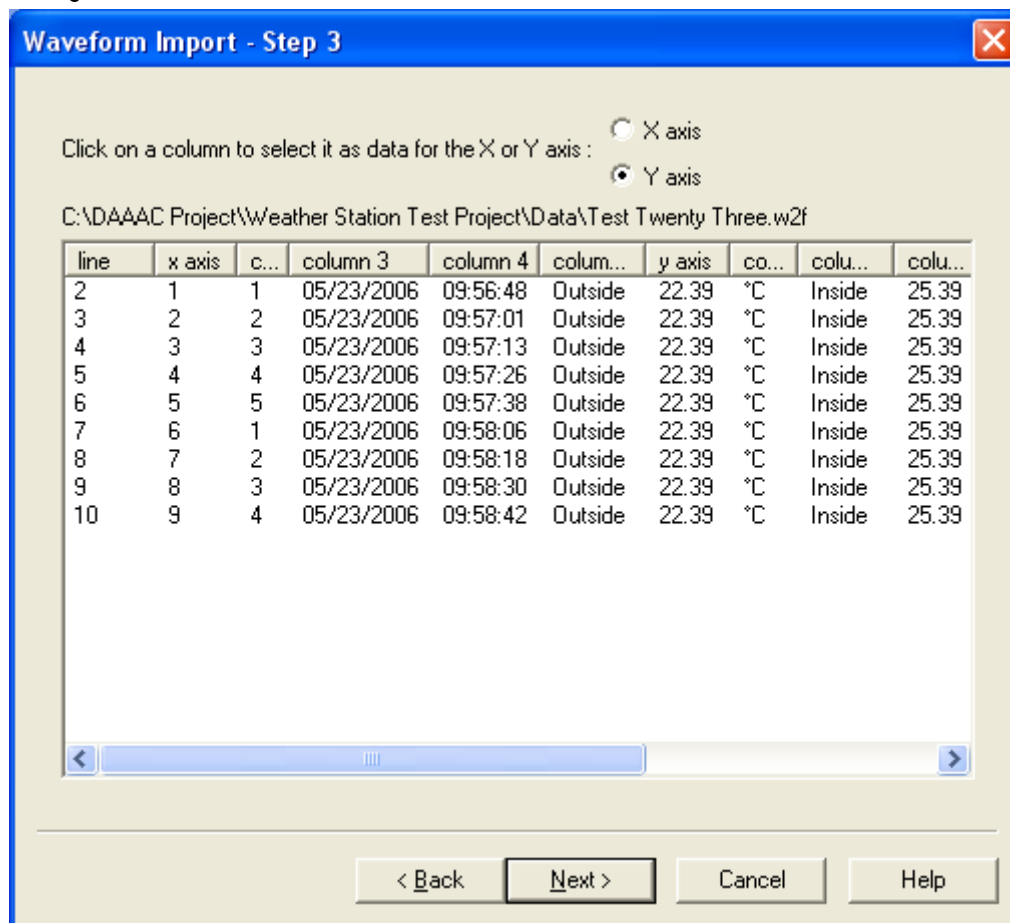
Figure 2-32 - Waveform Import Step 3

2.2.4.2 Discussion

After the input file has been properly segmented into columns, two of the columns must be se-
lected. The first specifies the data vector that is to form the independent data axis and the second
represents the dependent data. The columns are selected by first choosing the data vector type
(independent = X axis, dependent = Y axis), then clicking on a column heading to make the as-
sociation. As a column is selected its header will change title from Column *N* to "x axis" or "y
axis".

2.2.4.3 Details
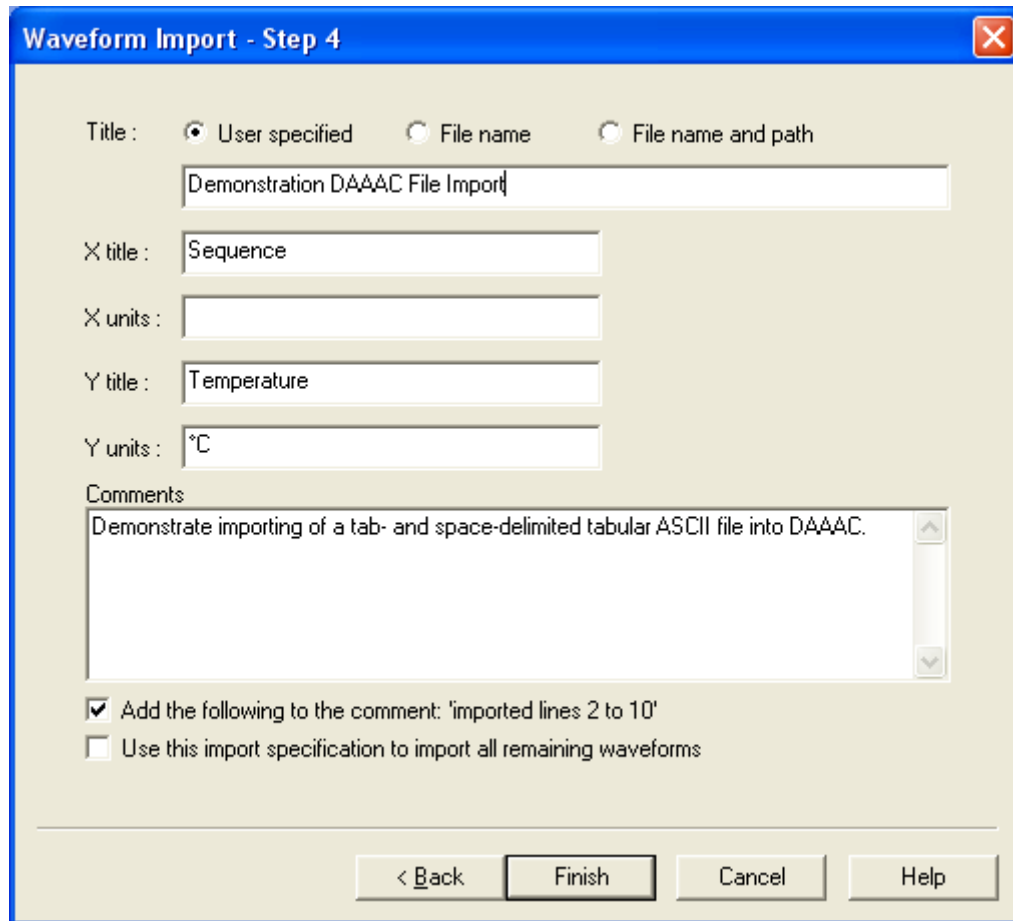
Item	Description
X axis	Selecting this radio button prepares the dialog to assign the independent data vector by clicking the column header of the appropriate column.
Y axis	Selecting this radio button prepares the dialog to assign the dependent data vector by clicking the column header of the appropriate column.
Line	Line number in the imported file.
column *N*	The serialized header of the *N*th column as defined by the selected file delimiters.
x axis	The header of the column that has been assigned as the independent data vector. This value has been changed from "column *N*" by selecting the X axis radio button and clicking on the column *N* header.
y axis	The header of the column that has been assigned as the dependent data vector. This value has been changed from "column *N*" by selecting the Y axis radio button and clicking on the column *N* header.

2.2.4.4 How Accessed

- File->Import Waveforms…

2.2.5   Import Waveform – Step 4 – Set Titles

2.2.5.1   Dialog

Figure 2-33 - Waveform Import Step 4

2.2.5.2   Discussion

The next dialog assigns text to the waveform in the form of plot title, axis labels and units and a comment field.

2.2.5.3   Detail

Item	Description
Title: User specified	With this radio button checked, File name and File name and path are unchecked. The Title (unlabeled) text control is enabled. The Title control is to be used to provide the major label for the data when it is plotted.
Title: File name	With this radio button checked, User specified and File name and path are unchecked. The Title (unlabeled) text control is disabled. In this case the major label for the plotted data is automatically assigned as the import file name.
Title: File name and path	With this radio button checked, User specified and File name are unchecked. The Title (unlabeled) text control is disabled. In this case the major label for the plotted data is automatically assigned as the import file path and name.

Title (Unlabeled)	This control is enabled if User specified is selected, otherwise it is disabled. Text entered into this control will serve as the major label for the plotted data.
X title:	Descriptive label for the independent (X axis) data when it is plotted
X units:	Additional label for the independent data that specifies the units represented by the data.
Y title:	Descriptive label for the dependent (Y axis) data when it is plotted
Y units:	Additional label for the dependent data that specifies the units represented by the data.
Comments	General text describing the data that is maintained with the data in the database.
Add the following…:	When checked, the data range is automatically appended to any comments entered by the user.
Use this import specification…	When checked, the text entered in the dialog controls is automatically applied to all subsequent data imports in the current import batch.

2.2.5.4   How Accessed

- File->Import Waveforms…

2.2.6   Modules

2.2.6.1   Dialog
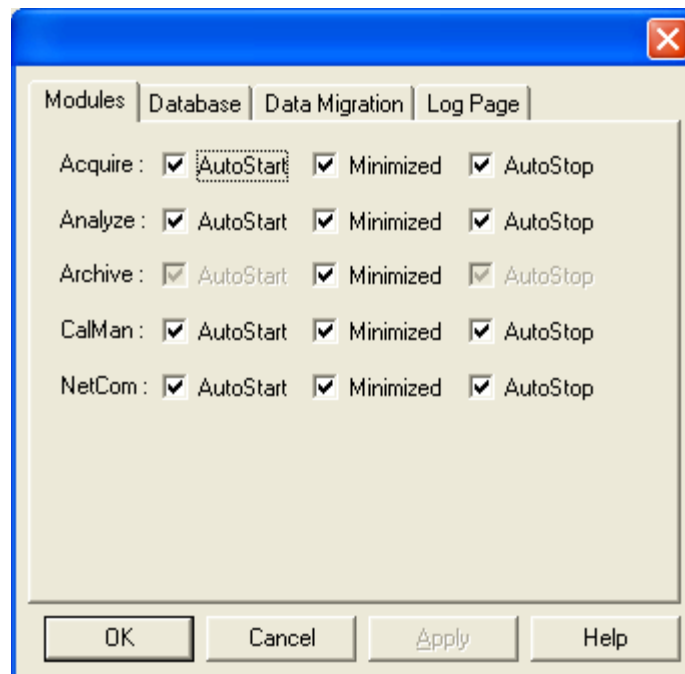
Figure 2-34 - Modules Startup/Shutdown Preferences Tab

2.2.6.2 Discussion

The Modules page contains switches that control the behavior of the DAAAC modules when Archive is started and stopped. Autostart checked starts the module when Archive is first started. Minimized checked minimizes the module's window when Archive is first started. Autostop checked stops the module when Archive stops.

2.2.6.3 How Accessed

- Preferences->Options…->Modules

2.2.7 Database

2.2.7.1 Dialog
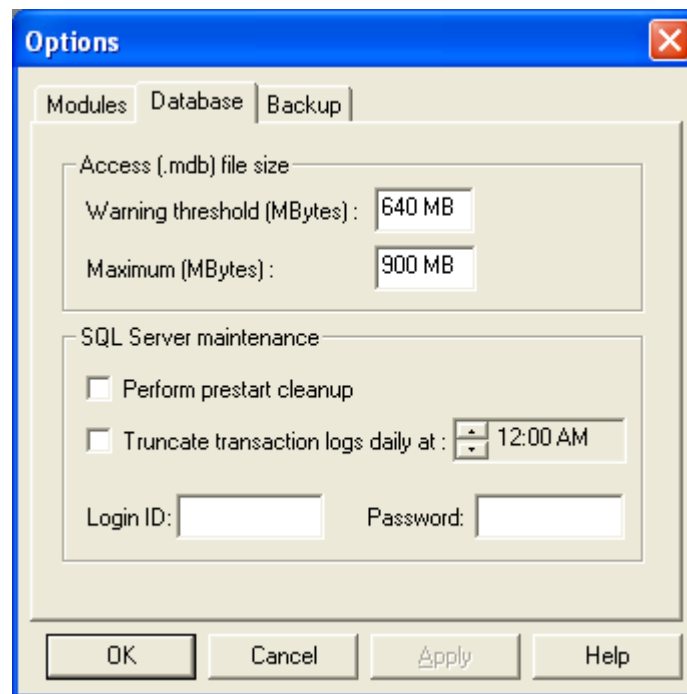
Figure 2-35 - Database Preferences Tab

2.2.7.2 Discussion

The Database page is used to configure automated database maintenance and notices. Note that some options only apply to standalone MS Access database, while others only apply to networked SQL Server databases.

Item	Description
Warning Threshold	Sets the file size warning level for Access databases. When the threshold is reached, a database warning will be issued at the start of each acquisition event.
Max DB size	Sets the file size limit for Access databases. When this limit is reached, no new acquisition events will be permitted. Note that Access databases created by DAAAC have a hard limit of 1 GByte.
Prestart cleanup	Run the SQL database cleanup utility each time DAAAC is started.

Truncate SQL transaction logs	Performs automated truncation of the SQL Transaction Logs, each day at the user specified time.
Login ID / Password	Login ID and Password required by SQL Server to operate on the Transaction Logs.

2.2.7.3   How Accessed

- Preferences->Options…->Database

2.2.8   Backup

2.2.8.1   Dialog
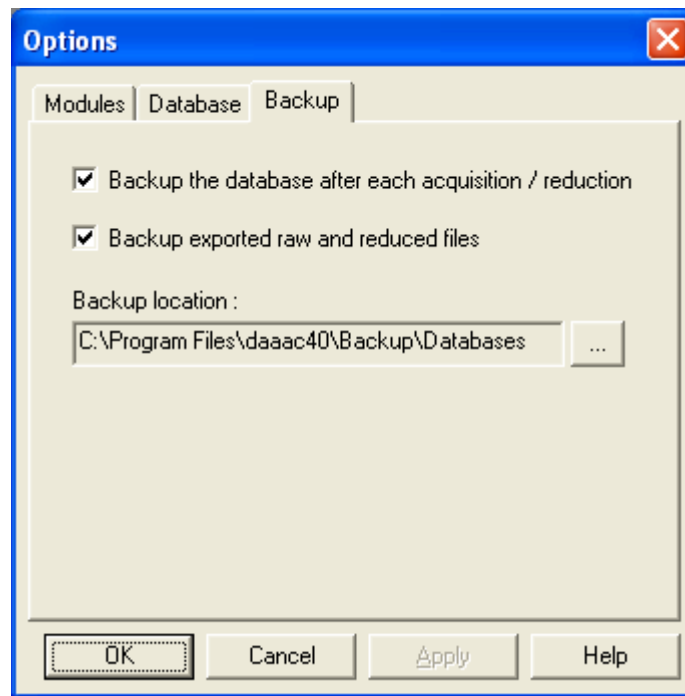
Figure 2-36 - Backup Preferences Tab

2.2.8.2   Discussion

The Backup page is used to configure automated backup of exported files and the database.

This page is only available for standalone installations.

Item	Description
Backup the database…	Copies the active database file to the specified location at the conclusion of each acquisition event. Any previous backup copies are overwritten.
Backup exported files	Copies all auto-exported files to the specified location at the time those files are created.
Location	Location for all backup files.

2.2.8.3   How Accessed

- Preferences->Options…->Backup

2.2.9 Data Migration

2.2.9.1   Dialog
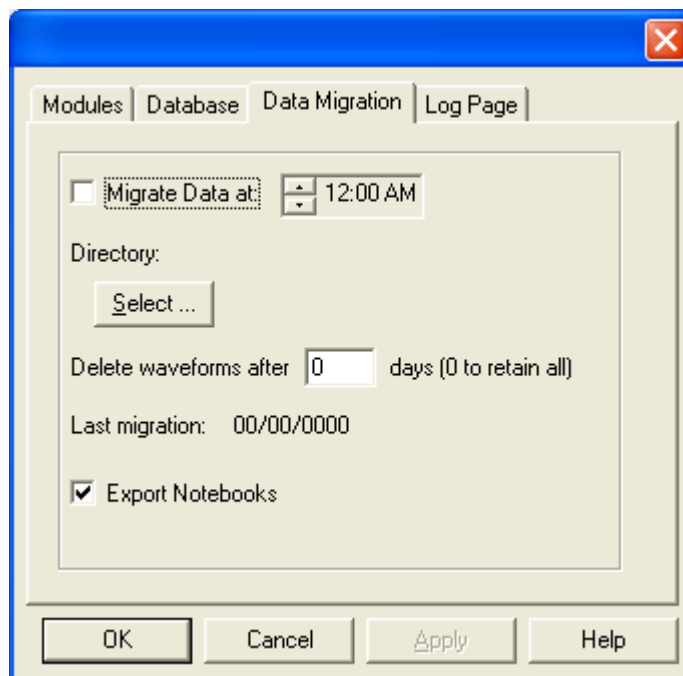
Figure 2-37 - Data Migration Tab

2.2.9.2   Discussion

The Data Migration page is used to automatically copy waveform / image data and their associated configuration data from the on-line SQL Server database to individual Access databases.

This page is only available for networked installations.

Item	Description
Migrate at	Enable migration to occur daily at the specified time.
Directory	Root level directory for the generated Access databases. Subfolders based on the migration date are automatically created under this directory.
Delete wave-forms…	Remove the migrated waveforms from the SQL database after the specified number of days.
Export Note-books	Check to copy the Notebook data from the SQL database to the Access database. Notebook data is not linked to the waveform data, so will not be automatically transferred with the other settings unless this item is checked.

2.2.9.3   How Accessed

- Preferences->Options…->Data Migration

2.2.10   Log Page

2.2.10.1   Dialog
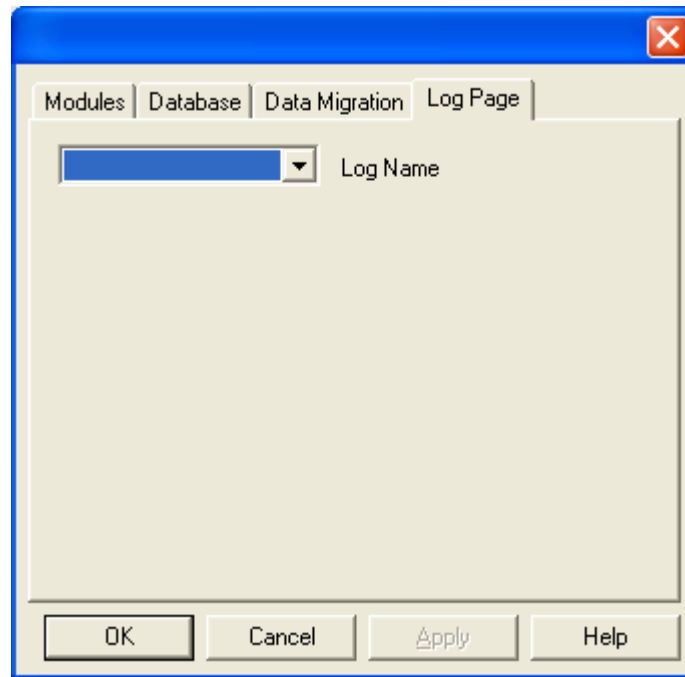
Figure 2-38 - Log Page Tab

2.2.10.2   Discussion

The Log page contains a list of log page names, or it will be blank if none exist. The log page is defined and accessed in Acquire.

This page is only available for networked installations.

2.2.10.3   How Accessed

- Preferences->Options…->Log Page

2.2.11 Select Server

2.2.11.1 Dialog
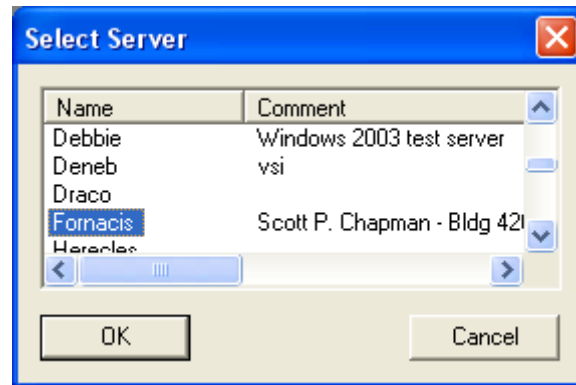
Figure 2-39 - Select Server Dialog

2.2.11.2 Discussion

When in networked mode, Select Networked Server runs NetCom from the specified re-mote computer on the network. Your computer must be networked to use this function. NetCom must be stopped to access this dialog.

2.2.11.3 How Accessed

- Tools->Administrative->Select Networked Server…

2.2.12 Inventory Control

2.2.12.1 Dialog
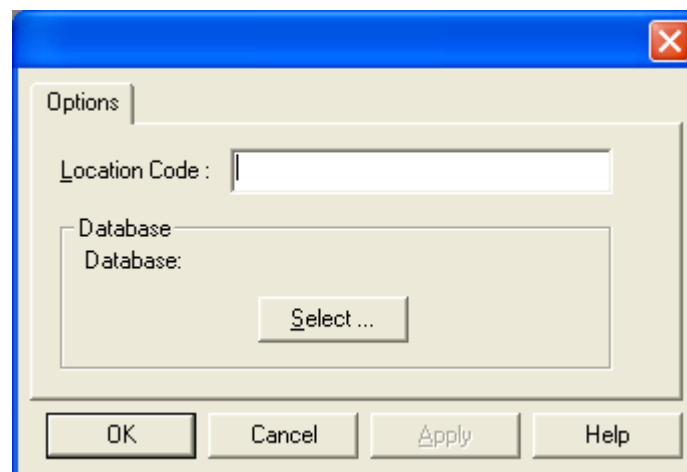
Figure 2-40 - Inventory Database Control

2.2.12.2 Discussion

The Inventory Control dialog defines the Location Code and directory location of the inventory control database. It is available under Archive's Administrative menu, which is available only when NetCom has been shut down.

2.2.12.3 Details

Item	Description
Location Code:	Sets the command line location code for the inventory control database.
Select	Opens a directory in which the inventory control database can be located.

2.2.12.4 How Accessed

- Tools->Administrative->Inventory Control…

2.2.13 Table Information

2.2.13.1 Dialog
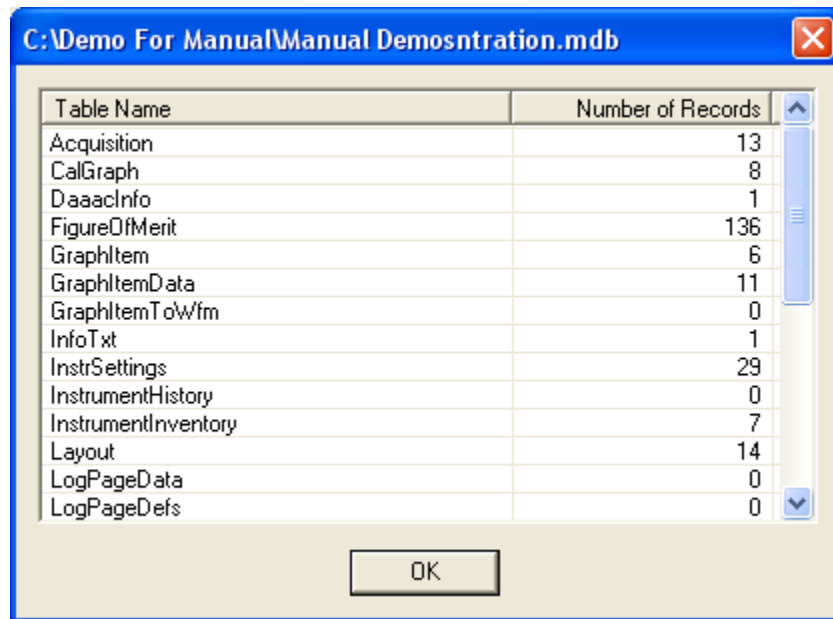
Figure 2-41 - Database Table Information Review

2.2.13.2 Discussion

This dialog lists, by name, each of the tables in the database. For the current database, it lists the number of records held by each of the tables. Appendix A – Database
Organization for a map of the organization of the database.

2.2.13.3 Details

Item	Description
Table Name:	The list, by name, of the tables that make up the database.
Number of Records	The list of the number of current entries in the associated table.

2.2.13.4 How Accessed

- Data View->Table Info

2.2.14 Transfer/Copy Data

2.2.14.1 Dialog
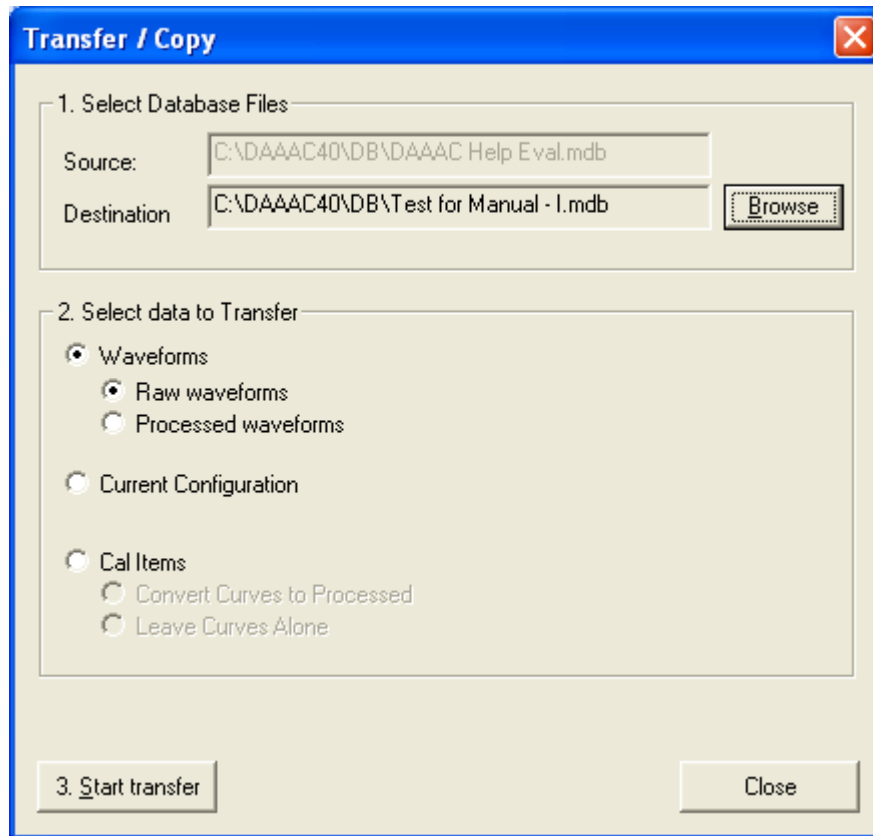
Figure 2-42 - Data Transfer Dialog.

2.2.14.2 Discussion

This dialog allows data, measurement configuration or Cal Items to be copied from the currently active database to another existing database.

2.2.14.3 Details

Click <u>B</u>rowse to navigate to and select the existing destination database. Select Wave-form, Configuration or Cal Item transfer. For waveforms or cal items, refine the selection. Then click <u>S</u>tart Transfer. Transferring waveforms transfers the waveforms and all associated settings. (Ex: Instruments, Cal Graph, etc.).   Current Configuration transfers move only acquisition and cal settings, not waveforms. Current Configuration and Waveform transfers only transfer Call Items that are in use. (In use means selected in the Cal Graph.) Cal Items transfer all items in the cal inventory.   It also transfers any waveforms used as a calibration curve. The Cal Curve waveforms are transferred without associated settings.

2.2.14.4

Item	Description
Source:	Disabled – The path and file name of the currently active database from which the data is to be copied.
Destination:	Read-Only. The path and file name of the target database to which the data is to be copied. This control is updated with the file information determined using the Browse: button.
Browse:	Click this button to open a standard Windows file browser dialog that should be used to identify the target database file to which to copy the data. Once the file is located and the browser is closed, the Destination: control is updated with the file name and file path.
Waveforms	Indicates that waveform data, as opposed to configuration data, is to be copied. When this control is checked, Current Configuration and Cal Items are unchecked. Checking this control enables Raw waveforms and Processed waveforms.
Raw waveforms	When checked, only raw data, acquired directly from hardware, will be transferred. When this control is checked, Processed waveforms is unchecked. This control is enabled when Waveforms is checked. Otherwise it is disabled.
Processed Waveforms	When checked, only processed data, derived by CalMan from collected raw data, will be transferred. When this control is checked, Raw waveforms is unchecked. This control is enabled when Waveforms is checked. Otherwise it is disabled.
Current Configuration	Indicates that the station configuration data, rather than collected or processed instrument data, is to be copied. When this control is checked Waveforms and Cal Items are unchecked and Processed waveforms and Raw waveforms are disabled.
Cal Items	Copies the CalMan inventoried Cal Items to the destination database. When this option is selected, Waveforms and Current Configuration are unchecked. Convert Curves to Processed and Leave Curves Alone are enabled.
Convert Curves to Processed	Store all cal curve transferred waveforms in the target database as processed waveforms.
Leave Curves Alone	Store all cal curve transferred waveforms in the target database as processed or raw waveforms, as they were in the originating database. The Cal Curve waveforms are transferred without associated settings.
Start Transfer	Initiate the copy operation. Once started, the View Waveforms dialog (Figure 2-29) will appear, if a waveform data transfer is selected. The dialog is used to select the waveforms for transfer. Then a transfer progress dialog will appear regardless of the transfer type.
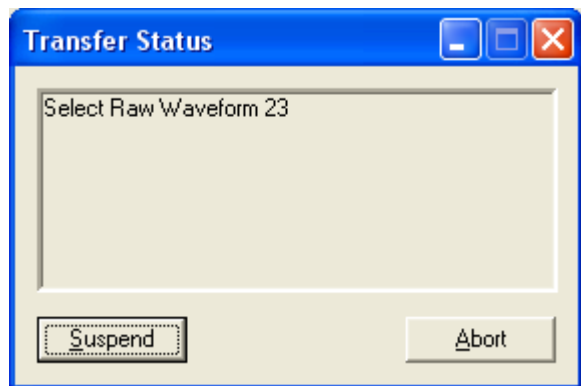
2.2.14.5 How Accessed

-

2.3 CalMan

2.3.1 Print Graph

2.3.1.1 Dialog
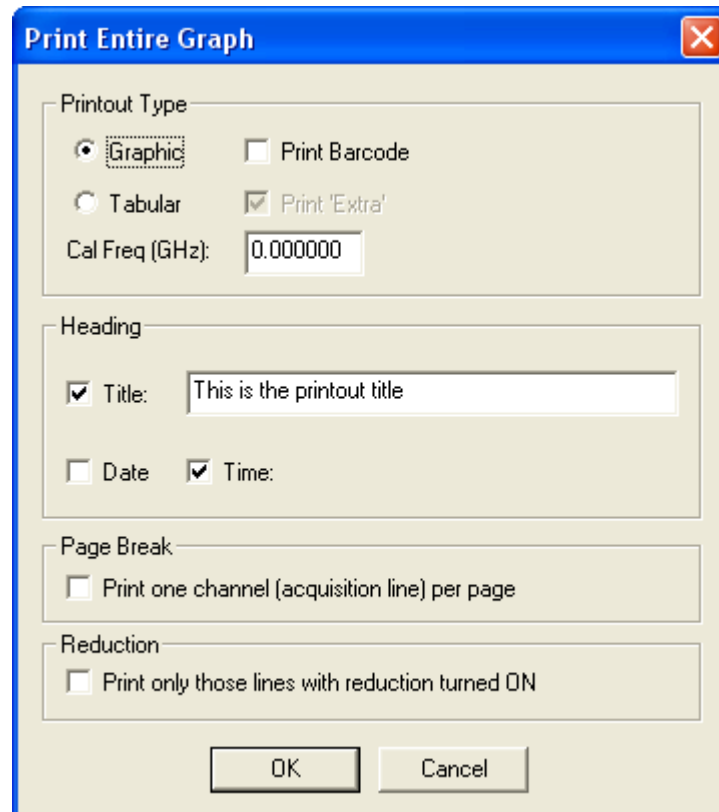
Figure 2-43 - Graph Print Configuration

2.3.1.2 Discussion

When printed, all graph Cal Items are listed and grouped by instrument and channel. The items are printed in order as they appear in the graph. Cal Item information includes item type, name/barcode, description, delay, and calibration factor.

2.3.1.3 Details

Item	Description
Printout Type	
Graphic/Tabular	Print items graphically (similar to the display) or as a textual table
Print Barcode	Print the instrument's barcodes, if they are assigned, along with the tabular instrument information.
Print 'Extra'	Show additional item information (e.g., cable type, attenuator type)

Cal Freq. (GHz)	The calibration frequency (GHz) will be printed on the document.
Heading	
Title	Print the title that is specified in the unlabeled text box on the document. The unlabeled text box is disabled if this option is unchecked.
Date	If checked, print the printout date on the document
Time	If checked, print the printout time on the document
Page Break	
Print one channel (acquisition Line) per page.	If checked, print each channel on its own sheet in the document
Reduction	
Print only those lines with reduction turned ON	If checked, do not print cal lines that are disabled.

2.3.1.4 How Accessed

- File->Print Graph Items…
- Also available from the File menu of the Line Summary display (See 2.3.13).
- Right-click on a Station, Instrument or Channel node in the graph and select "Print Graph Items…" from the popup menu.

2.3.2 File Export Range Selection

2.3.2.1 Dialog
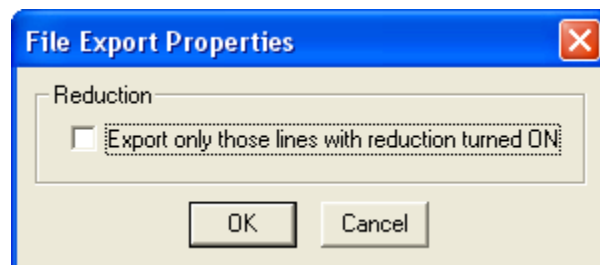
Figure 2-44 - Export Properties

2.3.2.2 Discussion

Determines if file export of the CalMan graph is to include all items or only those that have reduction enabled.

2.3.2.3 How Accessed

- File->File Export Graph Items (entire graph)
- Right-click on the Station node in the graph and select "File Export Graph Items (entire graph)" from the popup menu.
- Right-click on an Instrument node in the graph and select "File Export Graph Items (current instrument)" from the popup menu.

2.3.3 Graph Display Preferences

2.3.3.1 Dialog
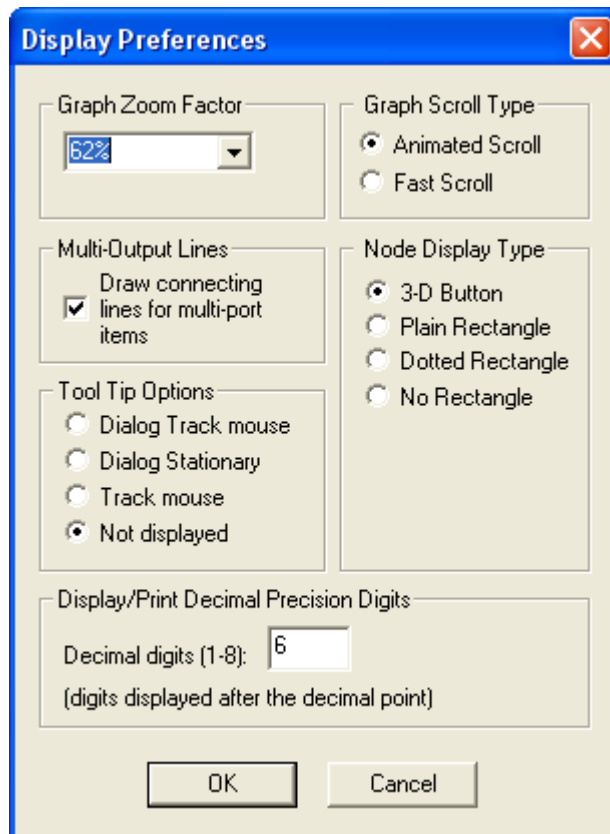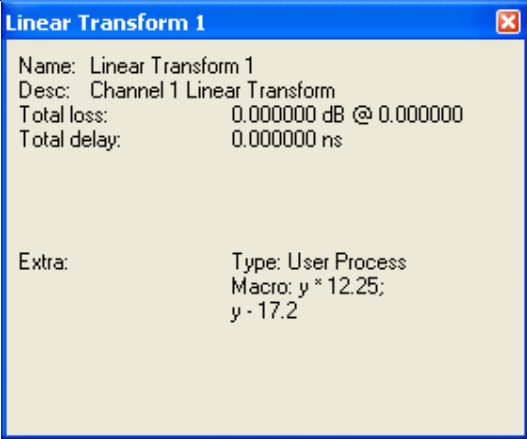
Figure 2-45 - CalMan Graph Display Preferences

2.3.3.2 Discussion

The Display Preferences dialog modifies the graph's appearance. These functions only alter the graph's appearance and are available to suit user preferences. They have no effect on data reduction operations.

2.3.3.3 Details

Item	Description
Graph Zoom Factor	Controls the size of the components of the graph. Preset values are available, or you may enter any number between 6% (very small) and 150% (very large). The default setting is 64%, which allows enough space to display the item's icon and a short name.

Graph Scroll Type	
Animated Scroll	Scrolls through the graph very smoothly, but slower than Fast Scroll.
Fast Scroll	Scrolls through the graph as quickly as possible.
Node Display Type	
3-D Button	Cal Items and other components are displayed as raised, dialog-type 3D buttons.
Plain Rectangle	Cal Items are displayed as simple, single-line rectangles.
Dotted Rectangle	Cal Items are displayed as a transparent (dotted) rectangle.
No Rectangle	No box/rectangle is drawn around each graph item, and the lines connecting Cal Items, instruments, and channels are changed to dotted lines.
Multi Output Lines	
Draw connecting lines for multi-port items	Dotted lines are drawn between Multi-Port Cal Items (Splitters and Combines) and their external connections (external from the current line). For example, if a splitter is in the graph and the output is set to other Cal Items, lines are drawn from the splitter's output arrow to the other item's input arrow.
Tool Tip Options	
Dialog Track Mouse	As the mouse is moved over any graph node, a window appears that shows details regarding the node configuration. The position of the window will follow the location of the mouse.
	Linear Transform 1 Name: Linear Transform 1 Desc: Channel 1 Linear Transform Total loss: 0.000000 dB @ 0.000000 Total delay: 0.000000 ns Extra: Type: User Process Macro: y * 12.25; y - 17.2
Dialog Stationary	As the mouse is moved over any graph node, a window appears that shows details regarding the node configuration. The position of the window is fixed with respect to the graph.
Track Mouse	
Not Displayed	No configuration report window appears when nodes are selected.
Display/Print Decimal Precision Digits	
Decimal Digits	Sets the precision of real-valued numeric values when exported or displayed.

2.3.3.4 How Accessed

- Preferences->Graph Display… or,
- Right-click on an empty portion of the graph, then select "Graph Display…" from the popup menu.

2.3.4   Print Barcode

2.3.4.1   Dialog
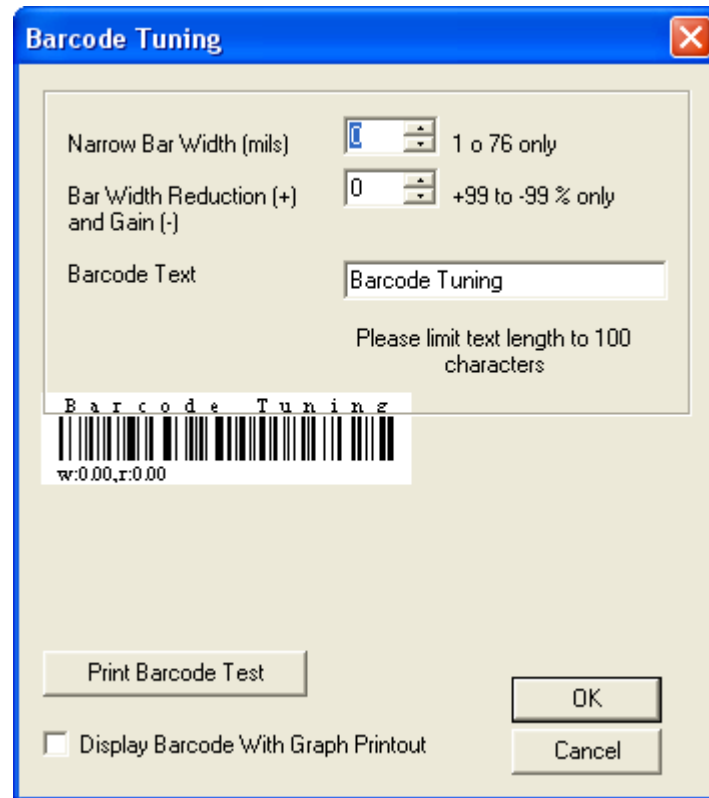
Figure 2-46 - Barcode Print Dialog

2.3.4.2   Discussion

The Barcode Print Setup dialog configures the size of the barcode when printing graphical of channels. This configuration is necessary because the printer resolutions vary in size and aspect ratio.

Bar codes are constructed of narrow and wide vertical bars. The Narrow Bar Width (mils) sets the width of the narrow bars, which in turn scales the wide bars when reset. The Bar Width Reduction increases (-) or decreases (+) the width of both types.

Check Display Barcode With Graph Printout to print a barcode for each item when printing the graph. Trial and error is sometimes the only method to find the correct settings. If the barcode is too wide to fit in the allocated space at the top of the Cal Item, an error message will be printed instead. If the bar code is too narrow, the barcode reader may not read the codes properly.

Use the Print Barcode Test to print a barcode of the text entered into the Barcode Text field.

2.3.4.3   Details

Item	Description
Narrow Bar Width (mils)	Sets the width of the narrow bars and scales the wide bars accordingly. Values are from 1 to 76 are permitted.

Bar Width Reduction (+) and Gain (-)	Decreases (positive numbers) or increases (negative numbers) the width of both narrow and wide bars.
Barcode Text	Sample text for use with Print Barcode Text (next item).
Print Barcode Text	Prints the Barcode Text (last item) with the current settings.
Display Barcode with Graph Printout	When checked, a barcode is printed at the top of each item node when printing a graphic description of Cal Lines.

2.3.4.4 How Accessed

- Preferences->Barcode Print Setup…

2.3.5 Item Reduction Defaults

2.3.5.1 Dialog
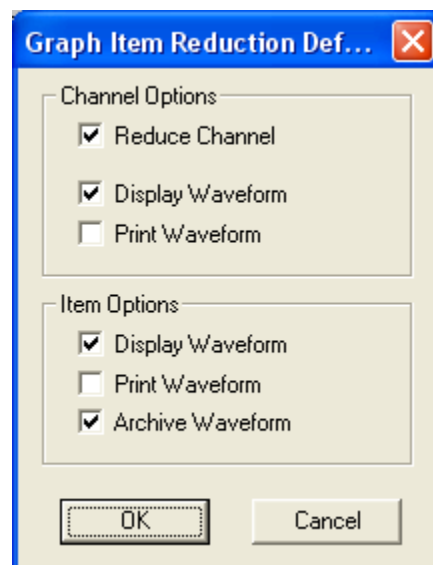
Figure 2-47 - Setting Defaults

2.3.5.2 Discussion

Cal Manager's Reduction Defaults dialog is used to set the default reduction settings when new Channels and Cal Items are inserted into the graph.

2.3.5.3 Details

Item	Description
Channel Options	
Reduce Channel	When checked reduction is toggled to on for this channel.
Display Waveform	When checked the channel's reduced waveform is displayed in Analyze during the reduction process.
Print	When checked the channel's reduced waveform is printed during the reduction proc-

Waveform	ess.
Item Options	
Display Wave-form	When checked the item's reduced waveform is displayed in Analyze during the reduction process.
Print Waveform	When checked the item's reduced waveform is printed during the reduction process.
Archive Wave-form	When checked the item's reduced waveform is archived during the reduction process.

2.3.5.4 How Accessed

- Preferences->New Item Defaults…

2.3.6 Inventory List

2.3.6.1 Dialog
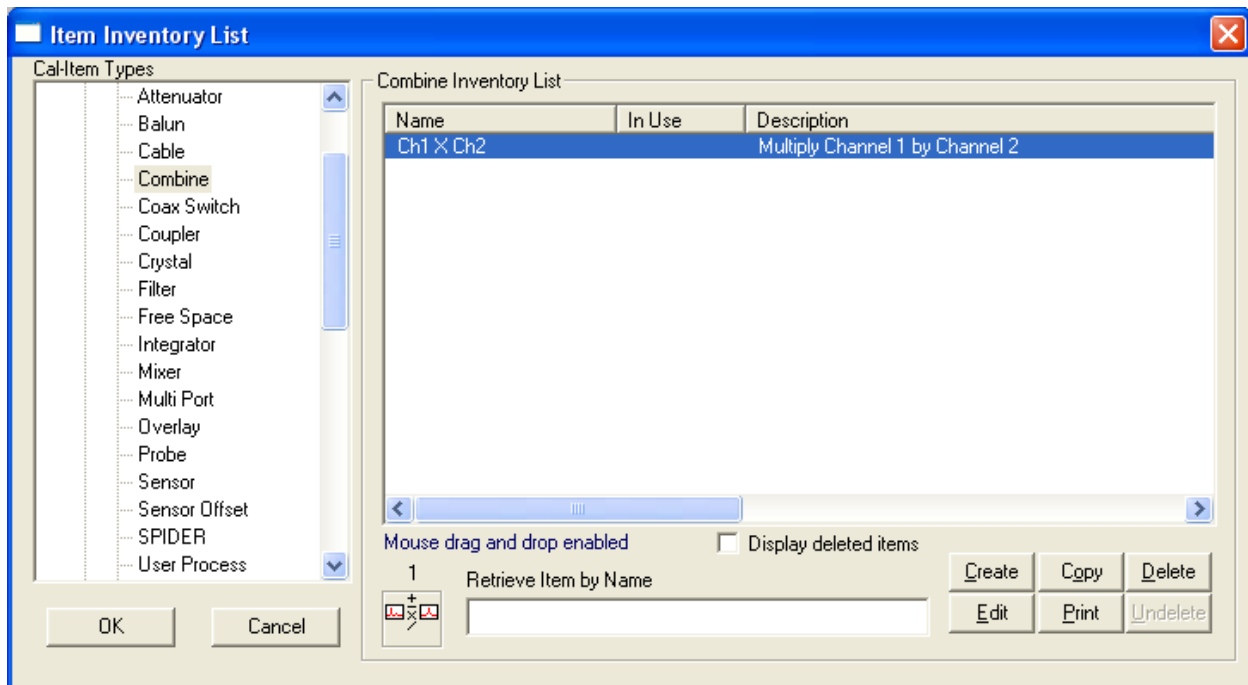
Figure 2-48 - Item Inventory Dialog

2.3.6.2 Discussion

The Inventory List dialog allows the creation editing, and deletion of Cal Items. It is also used from within the graph to select items for insertion into the graph. When this dialog is activated from the CalGraph's window menu (Inventory | Inventory List…), it becomes a "modeless" dialog that may remain active for dragging and dropping items onto the graph. It can remain active while the remainder of the program is used.

When this dialog is activated through the pop-up menu item "Insert a new item to the RIGHT | LEFT of this item," it is in the normal "modal" mode. This mode allows selecting an item for inserting into the graph by double-clicking the item, or by selecting the item and then

selecting the OK button. When the dialog is in this mode, it must be dismissed before any other part of the program may be used.

Note: another inventory list dialog, a smaller "drag and drop" inventory list is available from the Inventory menu item, but is used only for inserting items into the graph--you can't create or edit items from this dialog. See Drag and Drop Inventory List for specifics.

2.3.6.3   Details

Item	Description
Cal Item Type	This list contains all Cal Item devices supported by Cal Manager . The list groups items in three parts: WFM Reduction, Image Reduction, and No Reduction. Select the Cal Item type to edit, create, copy, delete, undelete, or print. Items already existing in the database are listed in the next list-box. When the Cal Item Types selection changes, the current inventoried types are displayed in the Inventory List, a small bitmap (picture) of the current item is displayed, and the total number of items listed in the Inventory List is displayed.
<Type> Inventory List	This list contains the Cal Items already in the inventory for the current type selected from the Cal Item Types list. The data displayed in this list box depends on the DAAAC system that is installed. For all systems, at least Name	Barcode, In Use and Description are listed. For performance reasons, the Description field is not initially displayed for any item. To display the description, select the item (single mouse click) with the mouse.
Name Retrieve Item by Name	Barcode	Retrieves items for editing if the name	barcode is known. This speeds database retrieval operations for systems with very large inventories. After this field is completed, use [Tab] to exit the edit field. This retrieves the item from the database. If found, it will be listed alone in the Inventory List-box. If it is not in the database, a message is displayed.
Edit	To edit the settings for an existing Cal Item, either double-click the item in the Cal Item's Inventory List column, or highlight the desired item then select Edit. Edit the item as desired, then select OK. The Cal Item is then updated in the Inventory List.
Create	To create a new Cal Item, select the type of item from Cal Items Type list (Amplifier, Attenuator, Balun, Bdot, and etc.), then select Create. An Inventory Data page for that Cal Item will open. Enter the data to create the configuration for this item, then select OK. The new Cal Item is then added to the Inventory List.
Copy	To copy a Cal Item, highlight the item in the <Type> Inventory list and press Copy. This will create a new item of the <Type>, and then activate the new item's user-interface with the Name or Barcode field blank so that a new and unique Name or Barcode can be entered. Remember, this field is the database key and it must be unique. The description field is copied along with item specific properties, but the following string is appended to the end of the description: "(copy)."
Delete	To delete a Cal Item, highlight the item in the <Type> Inventory List and press Delete. When the item is deleted, it can be undeleted. See Undelete (next item).
Undelete	Select this to undelete a previously deleted item. The "Display deleted items" check box must be checked so that the item is visible in the list. Deleted items' name or barcode are printed in red.
Print	To print a listing of the entire inventory of items, or only the current items displayed in the Inventory List, select the print command. This activates a message dialog that requires you to select an option. Choose either Only the items displayed in the item inventory list to print the current selection's inventory, or select The ENTIRE list of items in the inventory to print all of the Cal Item types.

Display deleted items	Check this item to display all deleted items. Deleted items name or barcode are printed in red.

2.3.6.4   How Accessed

- Inventory->Inventory List… (Modeless), or
- Select a channel or item node, right-click, then select "Insert a new item to the RIGHT (or "LEFT") of this item" from the popup menu. (Modal)

2.3.6.5   Inventory Printing

2.3.6.5.1   Dialog
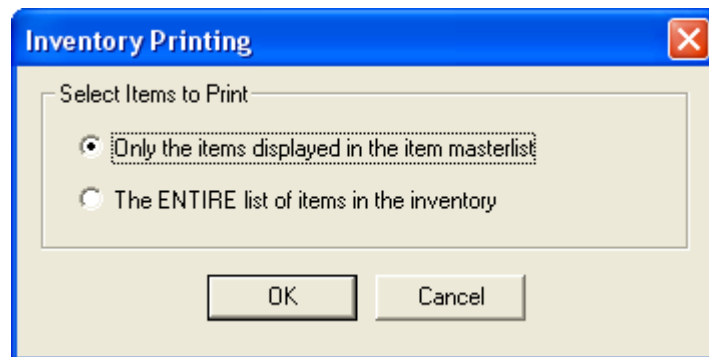
Figure 2-49 - Item Inventory Print Range Selection

2.3.6.5.2   Discussion

This control appears when the Print button is clicked in the Item Inventory dialog. It is used to select the range of items to print. Selecting the entire list of items in the inventory prints all Cal Items in the database, which may require considerable time if the database is large.

2.3.6.5.3   How Accessed

- Open the Item Inventory dialog as discussed in 2.3.6.4, then click Print.

2.3.7   Drag-and-Drop Inventory List

2.3.7.1   Dialog
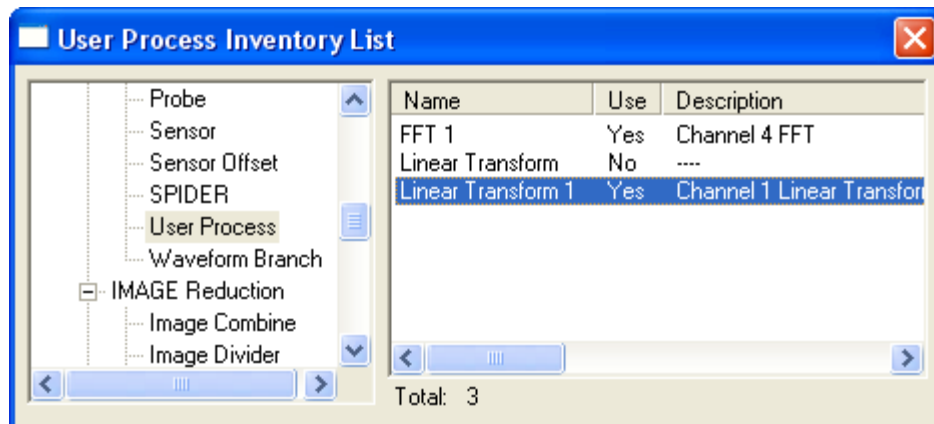
Figure 2-50 - Drag-and-Drop Item Inventory List

2.3.7.2   Discussion

This Drag-and-Drop Inventory List dialog inserts Cal Items into Cal Manager's graph by "dragging" them from the list, then "dropping" them on top of other Cal Items in the graph. The new Cal Item then is inserted to the right of the target Cal Item.

This dialog is more efficient for inserting Cal Items when there are many Cal Items to insert and these are already configured from the main Inventory List.

The Drag-and-Drop Inventory List differs significantly from the main Inventory List. First, once Drag-and-Drop Inventory List is opened, it can remain open while other parts of DAAAC are used (modeless dialog). Also, Cal Items are dragged from the dialog onto the graph to be inserted. The list of Cal Items (right list) displays only the item's main-attribute field and the description field. For strict inventoried systems, the main attribute is the barcode. For other inventoried systems, it is the item's name. To view the description, select the main attribute field.

This dialog contains only two lists: the device types and the actual Cal Items in the inventory. Also, this only places Cal Items in the graph. It cannot edit, create, delete or print items. However, it speeds the task of creating Cal Lines by allowing you to drag and drop items from the dialog into the graph.

2.3.7.3   Details

Item	Description
Left List	Lists the Cal Items supported by the current DAAAC installation. The current inventory for the currently selected cal item (in this listing) are displayed in the right-side list.
Right List	Current inventory of all cal items of the type selected in the left-side list.

2.3.7.4   How Accessed

- Inventory->Drag and Drip Inventory List…

2.3.8 Stations Selection

2.3.8.1   Dialog
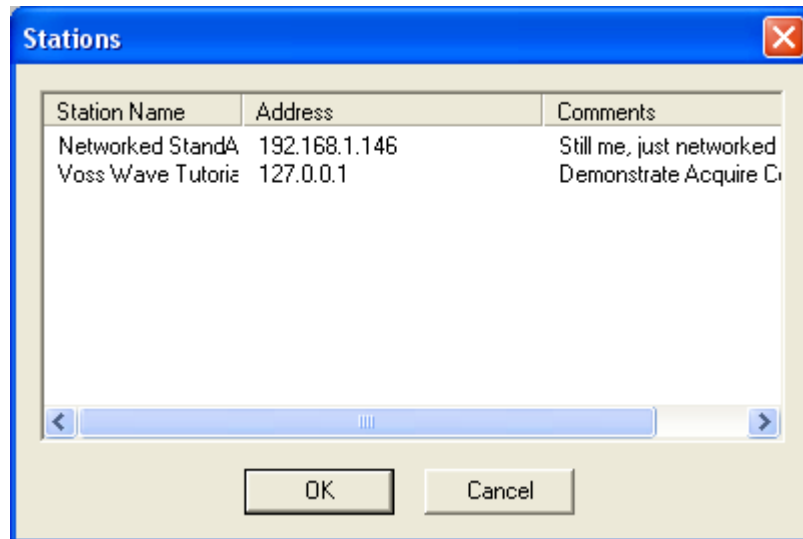
Figure 2-51 - Stations Selection Dialog.

2.3.8.2   Discussion

The Stations dialog selects the stations to be opened in Cal Manager. To open or change a station, simply select the station from the list then select OK. Cancel will dismiss the Stations dialog without making any change to the graph.

2.3.8.3   How Accessed

- Graph->Stations…
-

2.3.9 Lines Selection

2.3.9.1   Dialog
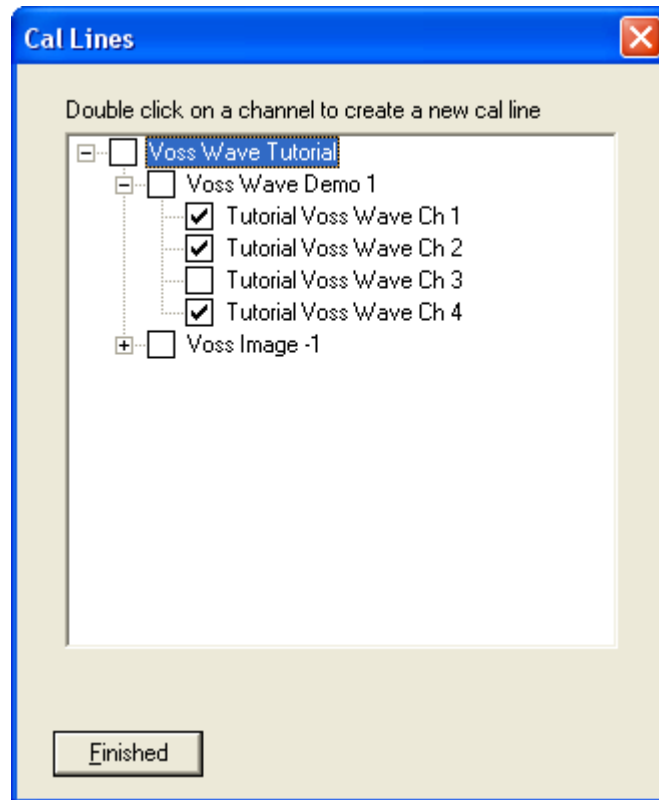
Figure 2-52 - Cal Lines Selection Dialog.

2.3.9.2   Discussion

The Cal Lines dialog lists all available instruments and channels for the current station. Because Cal Lines start with a channel, the channel is what is selected from this dialog and placed in the graph.

A check mark beside the channel indicates that it is already selected and displayed in Cal Manager's graph. Only those channels that have not been selected are available.

When a channel is selected to be added to the graph by double-clicking, the New Cal Line dialog will appear for entering an optional description. Channels are always placed in the graph beside and under their corresponding instrument. The instrument is automatically created when a channel is selected, then the channel is added to the first position beside the instrument. Only one instrument is displayed for all of its channels. Subsequent channels are placed in the graph in order under the instrument.

Once the Channel is included in the graph, Cal Items can be added to complete the Cal Line.
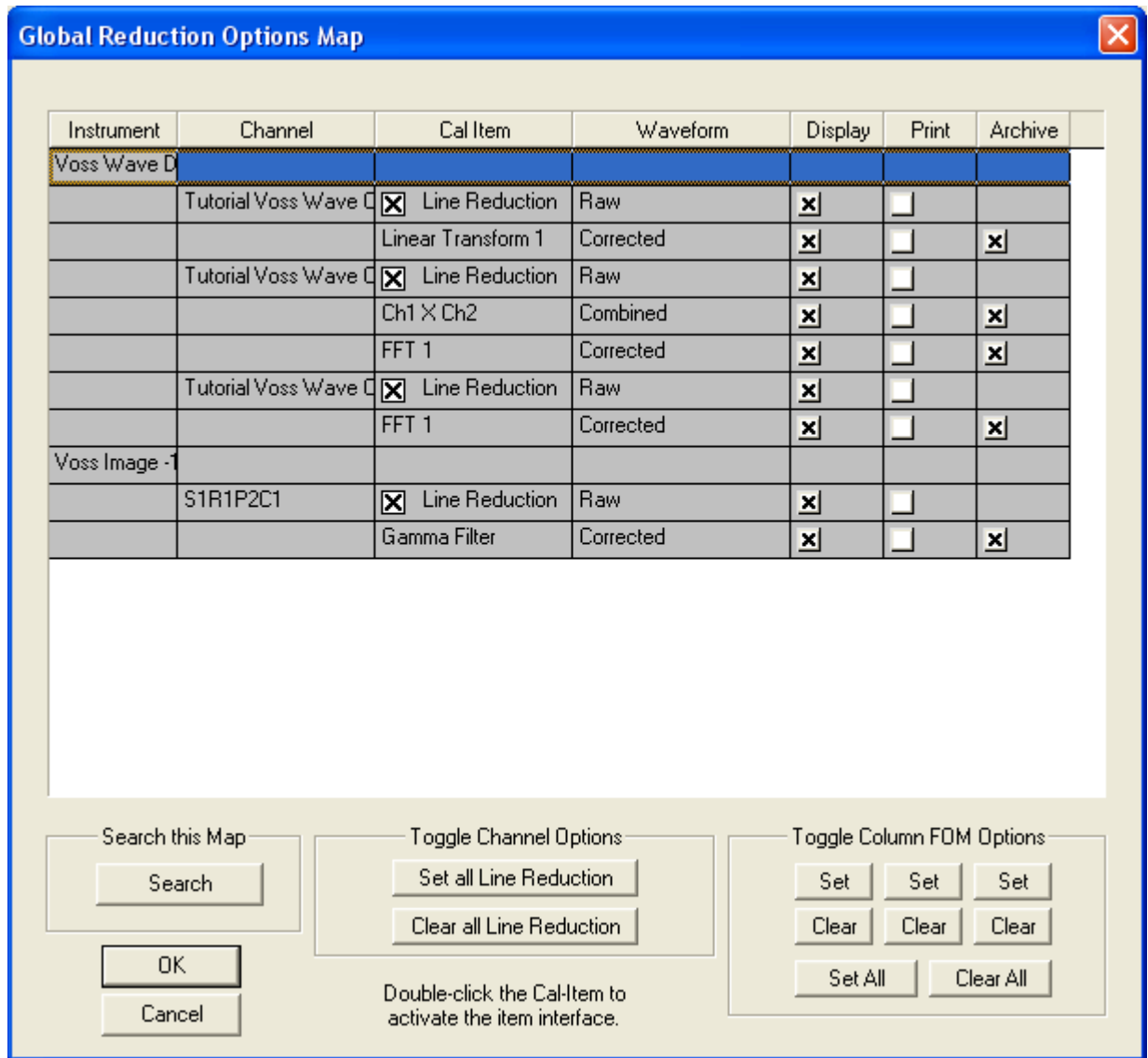
2.3.9.3   How Accessed

- Graph->Lines…
- Right-click on the Station node in the graph and select "Insert a new cal-line" from the popup menu.

- Right-click on an Instrument node in the graph and select "Insert Channel" from the popup menu.
-

2.3.10   Global Reduction Options

2.3.10.1   Dialog

Figure 2-53 - Reduction Options Map

2.3.10.2   Discussion

The Global Reduction Options Map configures reduction options for the current graph. Each entry in this dialog contains the same reduction functions that can be found in each of the Cal Item's reduction page, including the channel's line reduction switch. This dialog is more efficient to use when changes are necessary for many Cal Items.

This map displays all instruments, Cal Lines, and Cal Items attached to each channel. Line reduction can be toggled on and off, and output options for each can be set. The entire graph's reduction options (and most other properties) can be set or cleared at one time.

The Instrument is displayed in the first column. There are no options for the instrument entry.

Each channel is displayed in the second column. The first row for each channel contains a Line Reduction check-box, which is the same check-box option contained in the channel's dialog. When checked, reduction will be performed for the line, and for all items that are to be reduced (Display, Archive, or Print checked on). Double-clicking this column within the Line Reduction text activates the channel's dialog. This is the same dialog that is displayed and used from the graph. Any changes made in the item's dialog are recorded when OK is selected. These changes are updated in the graph's node when OK is selected.

Every channel row and every Cal Item row contain a Waveform type. The channel waveform name is Raw. Most Cal Items' waveform type is Corrected. However, some nodes do contain other waveform types. Every channel contains a Display and Print check box—the same options that are contained in the channel's Reduction page dialog.

All Cal Items attached to the channel are then listed just after the channel name. Each Cal Item row contains the same options: Cal Item (name), Waveform (type), and the waveform output selection: Display, Print, and Archive columns. If the Cal Item supports more than one waveform type, then each type is listed on a separate row and each has its own set of Display, Print, and Archive check-boxes.

Double clicking inside the Cal Item name field activates the item's dialog. This is the same dialog that is activated from the graph. Any changes made in this dialog are recorded when OK is selected. Also, any changes made in the Reduction page of this dialog are updated in this global map when OK is selected.

A Search function at the bottom left opens a dialog that searches this map for an instrument name, channel name, or an item name. If found, the row containing the target string will be highlighted.

The buttons beneath the Cal Item name column set or clear all of the channel-line reduction options. The buttons beneath each of the output columns (display, print, and archive) set or clear each column. Set All sets all output types in the map and Clear All clears all of them.

Search activates a dialog that examines the map for a specified string.

Select OK when you have made the required settings. All reduction information is then updated in each node of the graph. Selecting Cancel abandons any changes made. If any settings in any of he item's dialogs have been altered by double-clicking the Cal Item column, then Cancel will be disabled and all changes become permanent.

2.3.10.3 How Accessed

- Reduction->Global Selection Map…

2.3.10.4 Text Search

2.3.10.4.1 Dialog
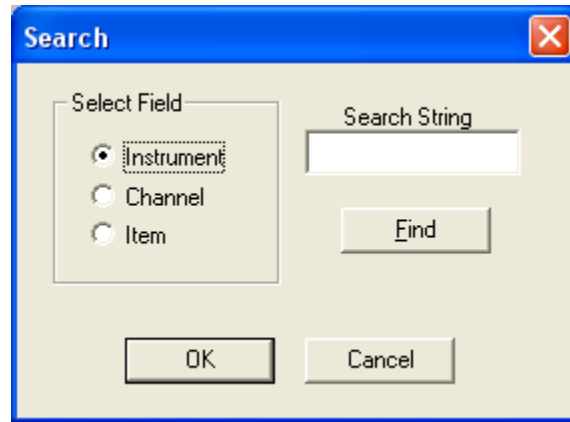
Figure 2-54 - Text Search Dialog

2.3.10.4.2 Discussion

The Search the Global Reduction Options Map dialog searches the map for the first occurrence of the search string.

2.3.10.4.3 Details

Item	Description
Select Field	Determines the field in the map to search. Check the appropriate item: Instrument, Channel or Item.
Search String	Enter the string to find. It must match a field that could exist in either the Instrument, Channel, or Item column of the map.
Find	Searches the map and highlights the row containing the search string.

2.3.10.4.4 How Accessed

Reduction->Global Selection Map…, then click Search.

2.3.11 Global Parameters

2.3.11.1 Dialog
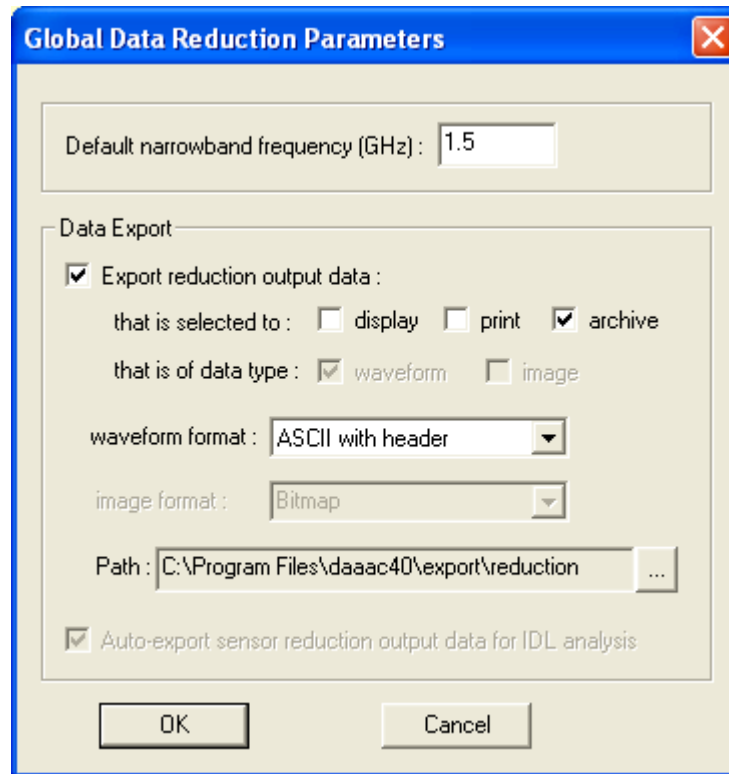
Figure 2-55 - Defining Global Data Reduction Parameters

2.3.11.2 Discussion

The Global Reduction dialog contains default preference choices that are applied at a global level.

2.3.11.3 Details

Item	Description
Default narrow band frequency	Enter a floating-point value for the global constant. The Default Frequency value is used with the channel nodes during data reduction.
Export reduction output data	Automatically exports the selected reduction data as it is created. Export is global (applies to all reduction outputs), but can be filtered by each output's display / print / archive settings. For example, selecting the archive checkbox here will only export output data that have the archive flag set.
waveform format	file format for all exported waveforms
image format	file format for all exported images [disabled – image export not yet supported]
Auto-export for IDL analysis	When checked, IDL files are created during reduction.

2.3.11.4 How Accessed

- Reduction->Global Parameters…,

2.3.12   Item Search

2.3.12.1   Dialog

Figure 2-56 - Item Search Dialog

2.3.12.2   Discussion

The Search dialog searches the graph for text that may be in any Cal Item. The search will be for the first field that contains text. For example, if all three fields contained a text string, the search is conducted for only the text in the first field. Likewise, if the Description and Location field contain text, the search will be for the entry in the Description field, the Location text is ignored.

2.3.12.3   Details

Item	Description
Name	Name field from the Cal Item data page to find. (Barcode instead of name for strict inventoried systems).
Description	Description from the Cal Item data page to find.
Location	Rack Location to find.
Start at Graph Top	The search begins at the top of the graph, not at the current line.
Start at Current Position	The search begins at the current line and ends at the end of the graph.
Match Exact (Case and Length)	If checked, the search will be for an exact match. That is, both the case and length of the string must be exactly the same (no sub strings). If not checked, the case is not considered and any substring found in the graph will be considered a match.
Search	When selected, begins the search. If a match is found, the graph node will be highlighted.

2.3.12.4 How Accessed

- Tools->Search…
- ![search icon]

2.3.13 Line Summary

2.3.13.1 Image
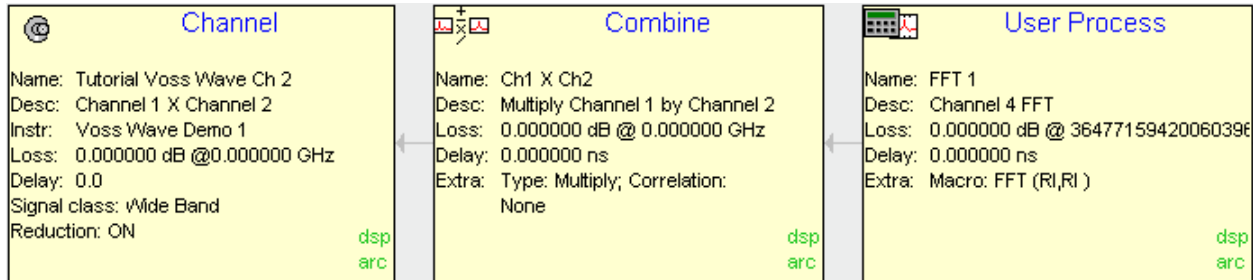
Figure 2-57 - Example Line Summary Display

2.3.13.2 Discussion

Line Summary is a special window used to display the contents of a single Cal Line in summary format. All Cal Items in the Cal Line are displayed in the same order as in the main graph window (starting with the Channel item at the far left). However, each item's node displays a detailed summary of the current state of that node.

Double-click any item's node to activate its user interface. Right-click anywhere in the window to activate a pop-up menu that contains items to activate a configuration dialog (Display Properties dialog), print the current line and close the summary window.

A Line Summary window displays specific information about each item in the Cal Line.The first node in the line, the Channel node, displays name, description, instrument attached with, total loss and delay for the entire channel, channel to mixer loss and delay if the channel contains a mixer, signal class (narrow band, wide band, image, antenna), and reduction status (on or off). Each Cal Item node also displays it name, description, its loss at frequency, and delay as well as specific information about itself. Specific information can be, for example for a cable, cable type, length and connector types.

The waveform reduction selections for each node (display, print, archive) are displayed in the lower right corner of each node. External links to each node are also displayed, for example the link to a Combine is printed at the bottom of each combined node. Links with other nodes are displayed at some position on or around the node, such as this item's link to a Combine node on another line.

2.3.13.3 How Accessed

- Tools->Line Summary, or
- Right-click on a channel node and select "Line Summary" from the popup menu.

2.3.13.4 Display Properties

2.3.13.4.1 Dialog
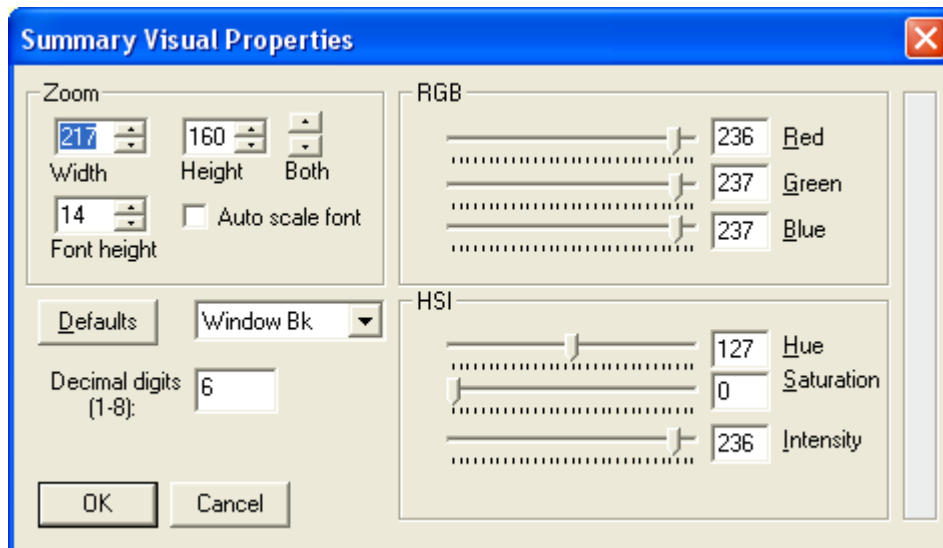
Figure 2-58 - Line Summary Display Options

2.3.13.4.2 Discussion

The Display Properties dialog, activated from the Line Summary window, is used to change the visual properties of the nodes in the summary.

2.3.13.4.3 Details

Item	Description
Width	Increase / decrease each node's width. Units are screen pixels.
Height	Increase / decrease each node's height. Units are screen pixels
Both	Increase / decrease both width and height. Units are screen pixels.
Font Height	Increase / decrease the height of the font used to display the text in each node.
Auto scale font	When checked, the font size is automatically increased / decreased when the node's height is changed.
Defaults	Changes all properties to the default values.
Drop List (Unlabeled – Default "Windows Bk")	List control contains a list of window property items for color changes. See the second graphic below for a list.
Decimal digits	Enter the number of significant decimal digits to print.
RGB	Red, Green, and Blue color controls.
HIS	Hue, Saturation, and Intensity color controls.
OK	Dismisses the dialog.
Cancel	Dismisses the dialog, but cancels any changes made to the window's properties (reinstates the window's properties as they were before this dialog was activated).

2.3.13.4.4 How Accessed

In the Line Summary view.

- Display Properties (Menu Item), or
- Right click in the display and select "Display Properties" from the popup menu.

2.3.14 Conversion Tool

2.3.14.1 Dialog
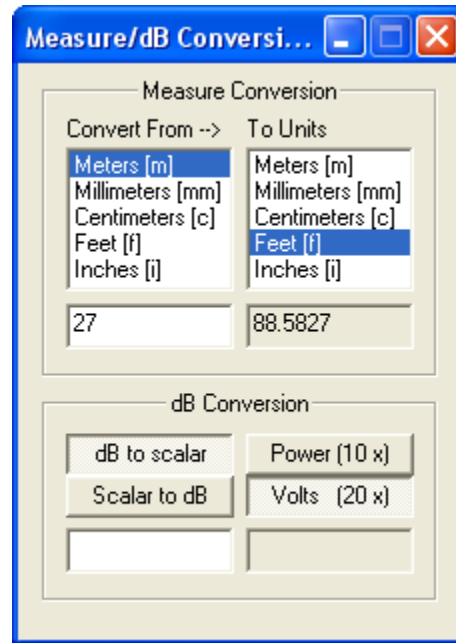
Figure 2-59 - Conversion Calculator Tool

2.3.14.2 Discussion

This tool provides a convenient calculator for converting a value expressed in a given unit of length to another. It also converts a scalar value to dB or a value expressed in dB to scalar.

2.3.14.3 How Accessed

- Tools->Conversions

2.3.15   Line Totals

2.3.15.1   Dialog
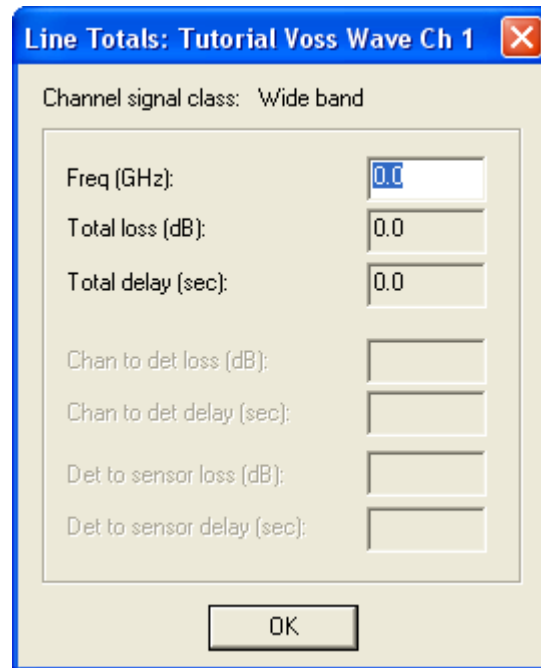
Figure 2-60 - Signal Line Statistics

2.3.15.2   Discussion

   This dialog presents an analysis of the effects of the Items in the cal line on the signal at a given frequency.

2.3.15.3   Details

Item	Description
Channel signal class:	Channel's signal class (e.g. wideband, narrow band, image)
Freq (GHz):	Frequency used to evaluate the loss through the components
Total loss (dB):	Total signal loss over the entire signal path at the selected frequency
Total delay (sec):	Total time delay over the entire signal path
Chan to det loss (dB):	Signal loss from the instrument to the detector (for narrow band only)
Chan to det delay (sec):	Time delay from the instrument to the detector (for narrow band only)
Det to sensor loss (dB):	Signal loss from the detector to the sensor (for narrow band only)
Det to sensor delay (sec):	Time delay from the detector to the sensor (for narrow band only)

2.3.15.4   How Accessed

- Right-click on a channel node and select "Line Totals" from the popup menu.
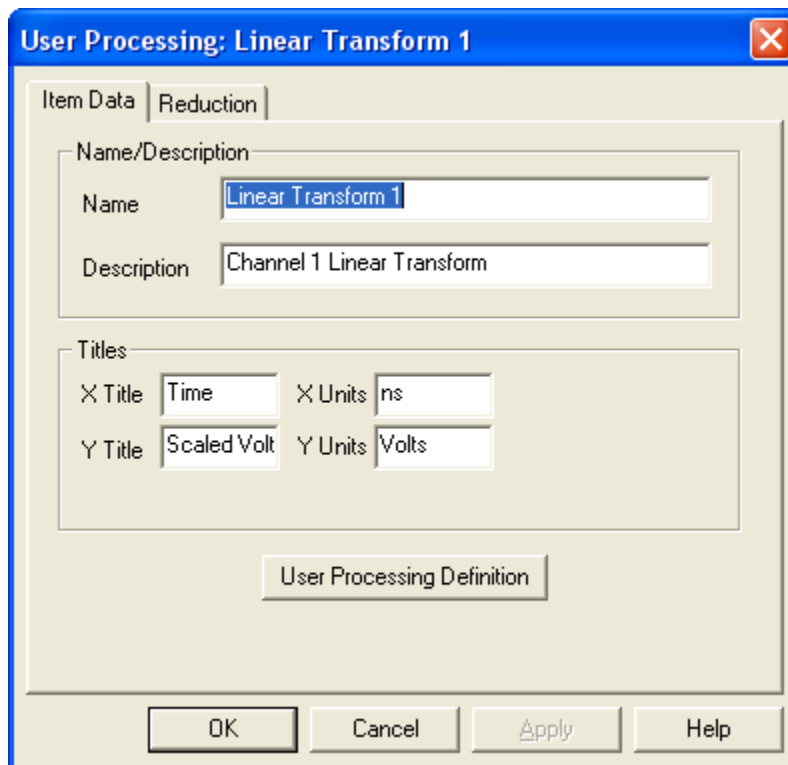
2.3.16   Item Data

2.3.16.1   Dialog

Figure 2-61 - Channel Item Data

Figure 2-62 – User Process Cal Item Data

Figure 2-63 - Attenuator Item Data

Figure 2-64 - Filter Item Data

2.3.16.2 Discussion

Several versions of the Item Data dialog tab may appear, depending on the type of Item from which the dialog is accessed. Figure 2-61 through Figure 2-64 show the dialog accessed from a channel node and from various item nodes. Specific Items are addressed in detail in Appendix E – Cal Items. Most of these dialogs access subdialogs with more-detailed configuration controls. These subdialogs are also detailed in Appendix E.

2.3.16.3 How Accessed

The dialog appears when an Item is created or edited in the Inventory List dialog or when a Channel or Item node is double-clicked in the CalMan graph.

2.3.17 Reduction

2.3.17.1 Dialog
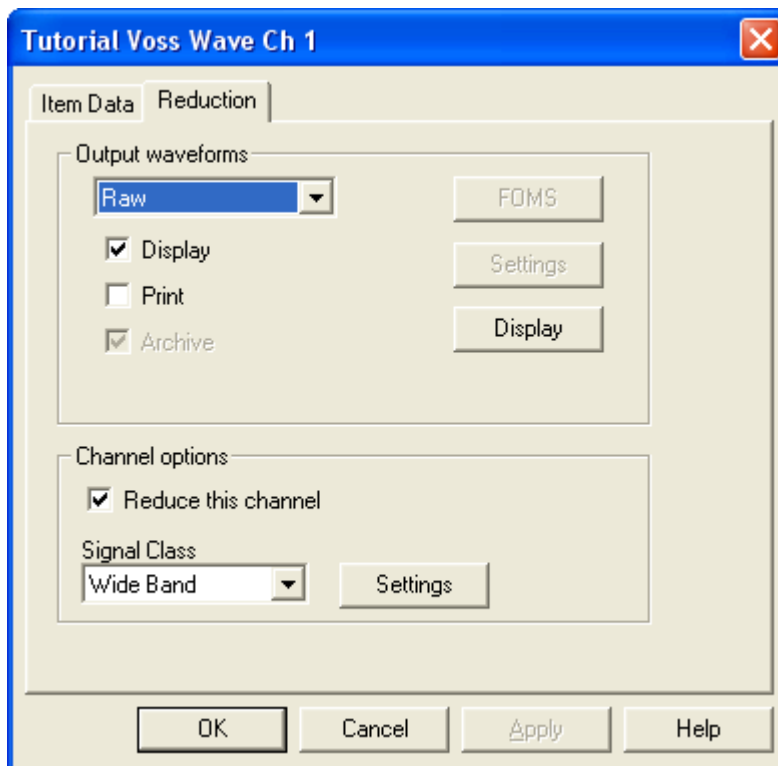
Figure 2-65 - Channel Node Reduction Dialog.
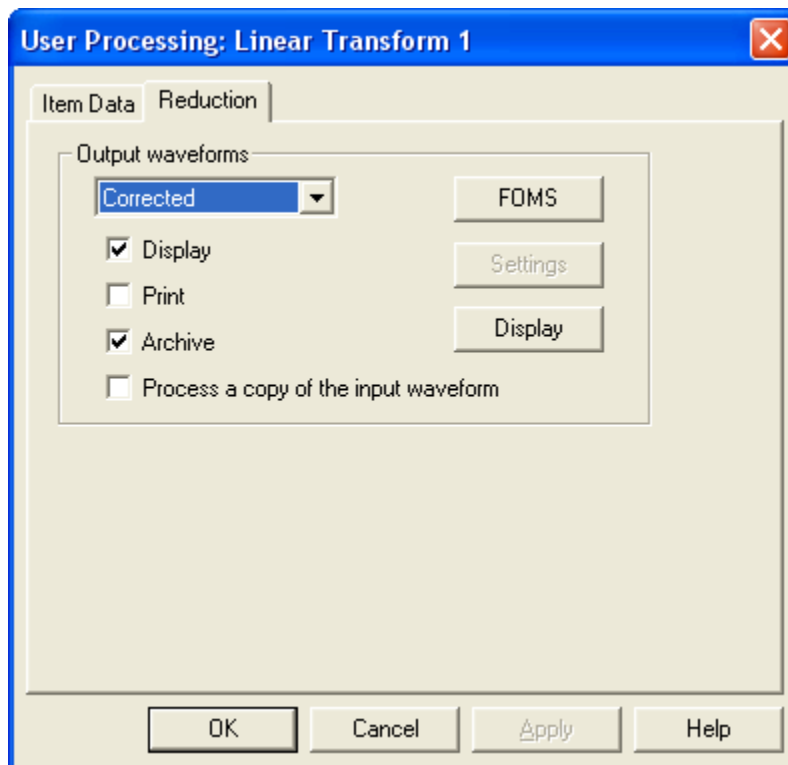
Figure 2-66 - User Process (Soft) Item Node Reduction Dialog.

Figure 2-67 - Hard Item Node Reduction Dialog.

2.3.17.2 Discussion

Three versions of the Reduction dialog are presented in Figure 2-65 through Figure 2-67. The first is opened from a Channel node and is the most complex. In addition to features of other dialogs, the type of reduction and whether the reduction is to be performed are selected here. The other two figures represent a soft and a hard Item node, respectively. The soft Reduction dialog adds a control to allow the operation to take place on the input data without changing the input as it is passed to nodes further down the cal line. These dialogs are also presented in Appendix E – Cal Items

2.3.17.3 Details

Item	Description
Corrected Output waveforms	This lists the available waveforms supported by the current item. In this version of DAAAC, all items except Mixers support only the Corrected type. Mixers support the following waveform types: Power vs. Time, Freq. vs. Time, Uncorrected Spectrum, and Corrected Spectrum.
Display	When on, the resulting, reduced waveform is displayed in the Analyze module (if Analyze is running and configured to display reduced data) during online reduction.
Print	When on, the resulting, reduced waveform is printed from the Analyze module (if Analyze is running and configured to accept reduced data) during online reduction.
Archive	When on, the resulting, reduced waveform archived to the database.
FOMs	Activates the FOMs dialog, which configures various Figures of Merit, based on waveform properties.
Settings	Activates the appropriate Settings dialog, based on the output waveform type selected. Currently, the Mixer item's waveform types are the only waveforms that can be configured.
Display (Button)	Open a subdialog that allows display limits to be set.
Process a copy of the input waveform	If checked, a copy of the input is processed and displayed. The original input waveform is passed unmodified to the next component for reduction so that the Cal Item will not affect the remaining reduction sequence.

2.3.17.4 How Accessed

This dialog is opened when a Channel or Item node is double-clicked in the graph.

2.3.18 FOMs

2.3.18.1 Dialog
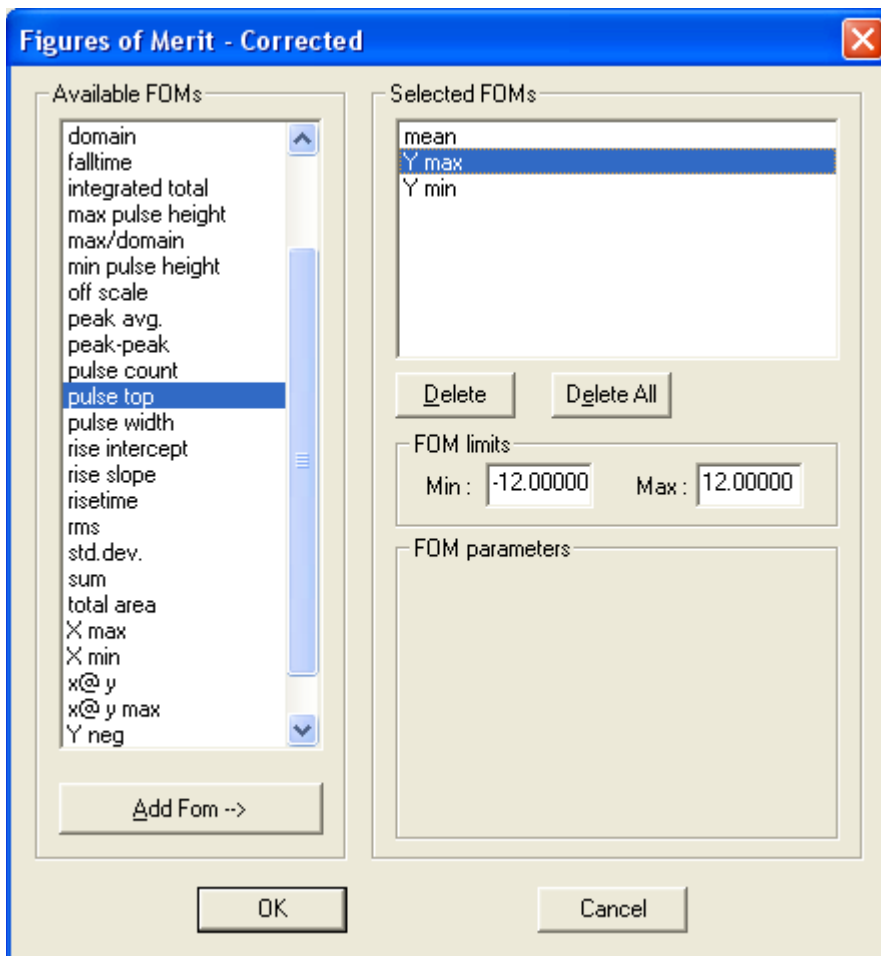
Figure 2-68 - Figures of Merit Configuration

2.3.18.2 Discussion

This page configures Figures of Merit for the current Cal Item. FOMs are values derived or computed from the reduction waveform. They are displayed with the waveform in the Analyze module, which must be configured to do so.

To specify and configure a FOM, highlight the desired FOM from the Corrected list, then select Add From to add the FOM to the Display FOMs list. The FOM is moved from the corrected list to the Display FOMs list; each FOM may be used only once. To delete a FOM from the Display FOMs list, highlight it and press [Del]. It then will be removed from the Display FOMs list and added back to the Corrected list.

Each FOM type defines different parameters. These parameters may be entered when the FOM is created (added to the Display FOMs list), or may be edited when the FOM in the Display FOM List is highlighted. The edited data are accepted when the dialog is dismissed or when another FOM is selected.

This dialog page is available from each Cal Item's Reduction page for the current reduction waveform. Appendix C – Figures of Merit (FOMs) presents a complete discussion of FOMs.

2.3.18.3 Details

Item	Description
Corrected	Listing of supported FOMs. To add a FOM to the reduction waveform, highlight the desired name in this list, then select Add FOM.
Add FOM	Add the currently selected "Corrected" FOM name to the Configured Display FOMs listing.
Configured Display FOMs	Listing of FOMs selected from the Corrected list. To remove one from the list, simply highlight the name and press Delete.
FOM limits	Waveforms with FOMs that fall outside the specified limits are flagged as "out-of-spec". Out-of-spec waveforms can be color coded when displayed in Analyze. To disable FOM limit checking, set min and max to the same value.
min	The minimum "in-spec" FOM value.
max	The maximum "in-spec" FOM value.
FOM parameters	Specific settings for each of the FOMs. Controls will appear here when specific parameters are required to define the FOM.

2.3.18.4 How Accessed

Double Click any Item node in the graph to open the item dialog. Select the Reduction tab. Click the Display button.

2.3.19 Settings

2.3.19.1 Dialog

Variable.

2.3.19.2 Discussion

The settings dialog is item dependent and will allow the user to configure additional reduction settings. Most cal items do not require this dialog.

2.3.19.3 Details

2.3.19.4 How Accessed

Double Click any Item node in the graph to open the item dialog. Select the Reduction tab. Click the Settings button.

2.3.20 Display

2.3.20.1 Dialog
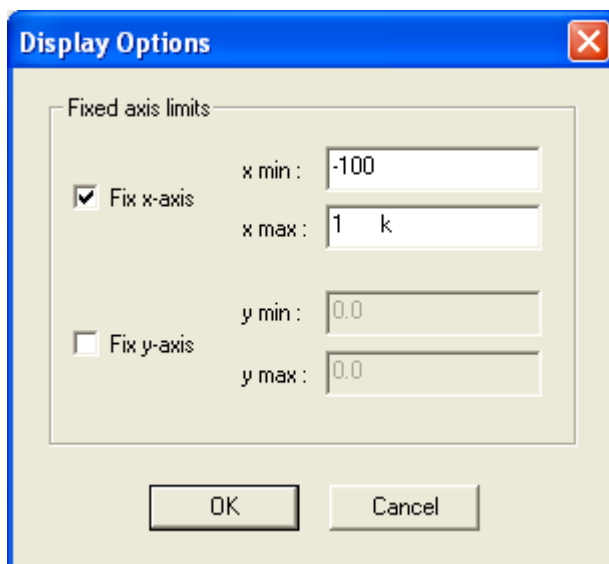
Figure 2-69 - Axis Limits Dialog.

2.3.20.2 Discussion

Use this dialog to set the X and Y Axis limits on the plot of the reduced data.

2.3.20.3 Details

Item	Description
Fix x-axis	When checked the X-Axis limits are manually set using the x min: and x max: controls. When unchecked, X-Axis limits are automatically scaled to the size of the data. x min: and x max: controls are enabled when this control is checked, otherwise they are disabled.
x min:	The value of the left-most limit of the horizontal (independent) axis. If the reduced waveform contains X data that is smaller than this value, the data will be truncated when displayed. This control is disabled unless Fix x-axis is checked.
x max:	The value of the right-most limit of the horizontal (independent) axis. If the reduced waveform contains X data that is larger than this value, the data will be truncated when displayed. This control is disabled unless Fix x-axis is checked.
Fix y-axis	When checked the Y-Axis limits are manually set using the y min: and y max: controls. When unchecked, Y-Axis limits are automatically scaled to the size of the data. y min: and y max: controls are enabled when this control is checked, otherwise they are disabled.
y min:	The value of the bottom-most limit of the vertical (dependent) axis. If the reduced waveform contains Y data that is smaller than this value, the data will be truncated when displayed. This control is disabled unless Fix y-axis is checked.
y max:	The value of the top-most limit of the vertical (dependent) axis. If the reduced waveform contains Y data that is larger than this value, the data will be truncated when displayed. This control is disabled unless Fix y-axis is checked.

2.3.20.4 How Accessed

Double-click any Channel or Item node in the graph to open the Reduction dialog. Click the Display button.

2.4 Analyze Dialogs

2.4.1 New Waveform

2.4.1.1 Dialog

Figure 2-70 - Create a User-Defined Waveform

2.4.1.2 Discussion

The Create Waveform processing page creates a new waveform, such as one used as a filter or test waveform. Create Waveform typically is used to create a new waveform window, but also can replace the data in an existing waveform. The Create Waveform page is not accessible during macro recording.

2.4.1.3 Details

Item	Description
Number of points	The total number of X/Y pairs to make up the waveform. Adjusting this value will results in adjustment of Delta X if it is established.
Delta X	The constant step size between independent X points of the waveform. This value can be automatically determined by the values assigned to Minimum value, Maximum value and Number of points. Delta X = (Maximum – Minimum)/(Number of Points – 1) Once the relationship is established, adjusting Delta X will adjust the Maximum value to keep the relationship consistent. This control is disabled if the "User specified x,y data" function is selected.
Minimum value	The X (independent) value of the left-most point in the waveform. Adjusting this value will results in adjustment of Delta X if it is established. This control is dis-

	abled if the "User specified x,y data" function is selected.
Maximum value	The X (independent) value of the right-most point in the waveform. Adjusting this value will results in adjustment of Delta X if it is established. . This control is disabled if the "User specified X,Y data" function is selected.
Function	Select from one of: • Constant • Ramp • Step • Pulse • Mod. Pulse • Gaussian • Formula • User specified Y data • User specified X,Y data The selection modifies the other controls in the dialog as specified in the discussion of those controls.
Variable 1	This is a text box whose label and value meaning change as the selection of a Function changes: The values are as follows: | Function	Control Value
Constant	Constant:
Ramp	Value at x min.:
Step	Step position:
Pulse	Step up pos:
Mod. Pulse	Short period:
Gaussian	Mean
Formula	Unlabeled/Disabled
User specified Y data	Unlabeled/Disabled
User specified X,Y data	Unlabeled/Disabled	
Variable 2	This is a text box whose label and value meaning change as the selection of a Function changes: The values are as follows: | Function	Control Value
Constant	Unlabeled/Disabled
Ramp	Value at x max.:
Step	Unlabeled/Disabled
Pulse	Step down pos:
Mod. Pulse	Long period:
Gaussian	Standard dev.:
Formula	Unlabeled/Disabled
User specified Y data	Unlabeled/Disabled
User specified X,Y data	Unlabeled/Disabled	
Formula: f(x) =	Defines the formula to be applied to the automatically generated independent values to produce the dependent data. This control is disabled unless the Formula function is selected. An example Formula is: $$4*\sin(6*x)**2 + 2**x$$
Data Values	This control opens a subdialog in which the user can specify the X and Y values at each point if the "User specified x,y data" function is selected or just the Y values if "User specified y data" is selected. The control is disabled if any other function is selected.

2.4.1.4   How Accessed

- File->New Waveform
- <Ctrl-N>

2.4.1.5   Waveform Value Editor

2.4.1.5.1   Dialog

Figure 2-71 – User-Specified Waveform Values.

2.4.1.5.2   Discussion

The dialog is used to hand-specify Y values in a "User specified y data" function selection or X and Y values if "User specified x,y data" is selected. For each of the number of points set in Number of points, independent values can be entered in Y value and X value, if enabled. A constant value can be used to fill Y values that have not been hand-specified. Unspecified values at the end of the list can be truncated, shortening the specified number of waveform points.

2.4.1.5.3   Details

Item	Description
X value	A list of values of the length specified in Number of points. If the function se-

	lected is "User specified x,y data", the user enters an independent X value for each of the points. If the function is "User specified y data", this list is disabled and filled with serial integer values starting at '1'.
Y value	A list of values of the length specified in Number of points. The user enters an independent Y value for each of the points. Unspecified points can be truncated from the end of the list using Auto-truncate. Alternatively, unspecified points can be set to the single constant value in Fill empty Y cells with the value:
Fill empty Y cells with the value:	Specify a constant value to fill all unspecified Y values. The values are filled when the focus leaves the control.
Auto-truncate	If checked, any unspecified values at the end of the Y list will be truncated causing the waveform to be shortened.

2.4.1.5.4   How Accessed

- File->New Waveform or <Ctrl-N>, then select the "User specified y data" or "User specified x,y data" function and click Data Values.

2.4.2   Select Waveforms

See Section 2.2.1, View Waveforms.

2.4.3   Import Waveforms

See Section 2.2.2, Waveform Import.

2.4.4   Properties Dialog

The Properties dialog contains multiple pages that display information about the data in the active window. The exact contents of each page depend on the data type – waveform, overlay or image. Properties is available from the File menu, or by selecting Properties from any waveform, overlay or image right-click pop-up menu.

Item	Description
General page	Waveform type (raw or processed), times created and modified and general acquisition information.
Statistics page	Number of points, minimum and maximum values for both axes and any Figures of Merit that are selected for calculation.
Labels page	Define main waveform title, axis titles and units and general comments for the waveform.
Display Options page	Selections for rendering the data.

2.4.4.1   General Page

2.4.4.1.1   Dialog
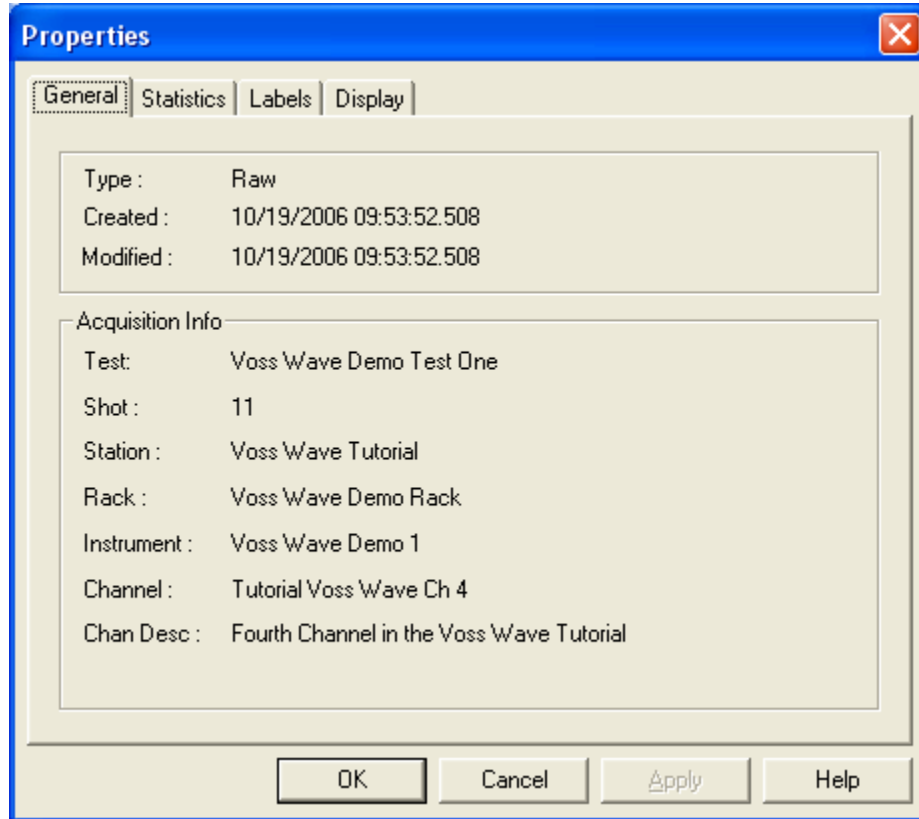
Figure 2-72 - Properties Dialog - General Properties Tab.

2.4.4.1.2   Discussion

The General page of the Properties dialog displays information about the active waveform, including the waveform type and the associated acquisition information. Imported data and waveforms created from the Create Waveform dialog (File | New, or Process | Create Waveform) have no acquisition information, so this section will be empty.

2.4.4.1.3   Details

Item	Description
Type	Waveform type: raw, processed, or auto processed.
Created	Date and Greenwich Mean Time (GMT) created.
Modified	Date and Greenwich Mean Time (GMT) last modified.
Test	The name of the test that the data was acquired under.
Shot	The shot number when the data was acquired.
Station	Station name the data was acquired from.
Rack	Rack name the data was acquired from.

Instrument   Instrument name the data was acquired from.

Channel   Channel name the data was acquired from.

2.4.4.1.4 How Accessed

- File->Properties
- Click on a plot, right-click, then select Properties… from the popup menu.

2.4.4.2 Statistics Page

2.4.4.2.1 Dialog
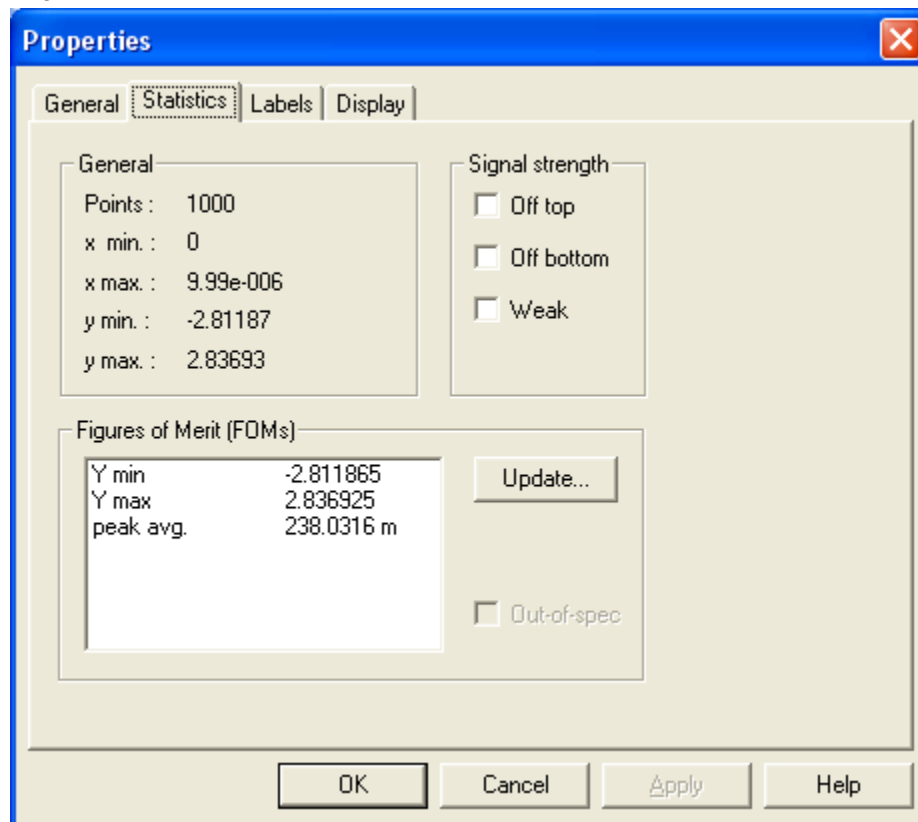
Figure 2-73 - Properties Dialog - Statistics Tab – Waveform Data

2.4.4.2.2 Discussion

The Statistics page of the Properties dialog displays the waveform point data, selected waveform FOMs, and signal strength statistics.

2.4.4.2.3 Details

Item	Description
Points	Total number of *x*/*y* pair, floating point waveform points that make the waveform.
x min	Minimum independent axis value.
x max	Maximum independent axis value.

y min	Minimum dependent axis value.
y max	Maximum dependent axis value.
Figures of Merit (FOMs)	Name and values of all computed Figures of Merit. FOMs are defined in Cal Manager for reduced, processed data, and in Analyze for newly acquired raw data.
Update FOMs	Displays the FOM selection dialog, which is used to select and calculate figures of merit for this waveform.
Signal strength	Off top, Off bottom or Weak are checked if the signal is clipped at the top or bottom, or if the signal used less than ten percent of the instrument's full scale setting.

2.4.4.2.4   How Accessed

- Click on a waveform plot, then File->Properties
- Click on an waveform plot, right-click, then select Properties… from the popup menu.

2.4.4.3   Image Statistics Page

2.4.4.3.1   Dialog
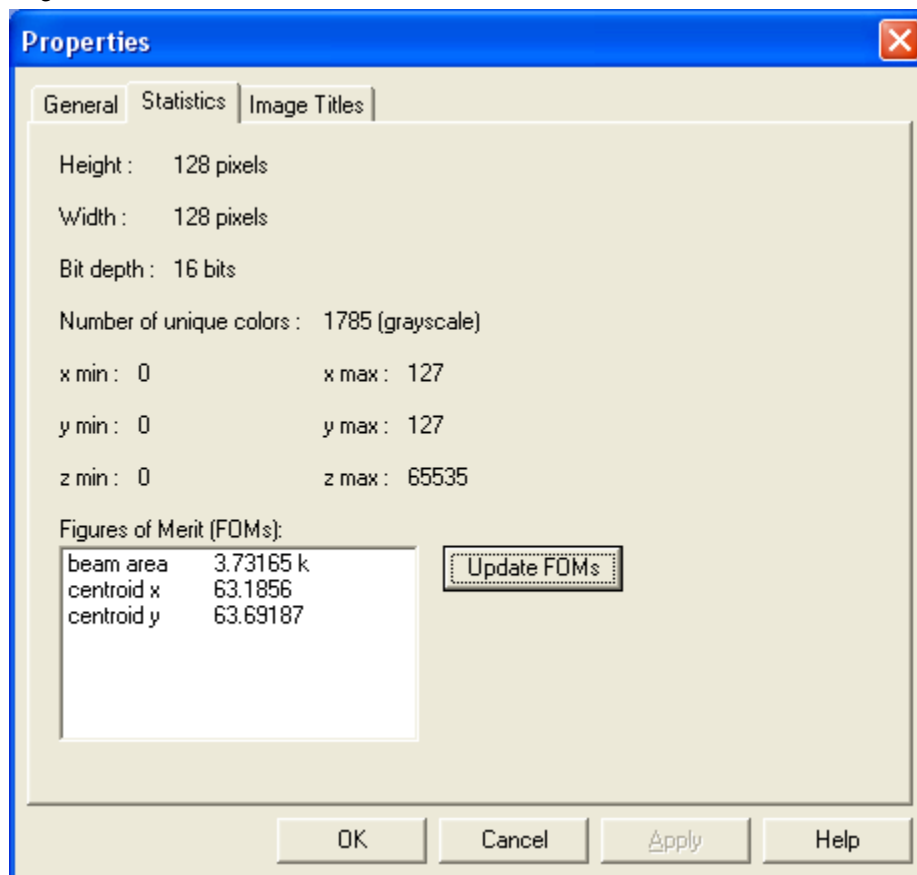
Figure 2-74 - Properties Dialog - Statistics Tab - Image Data

2.4.4.3.2   Discussion

The Statistics page of the Properties dialog displays the image size and depth data, as well as color information, axis limits, and FOMs.

2.4.4.3.3 Details

Item	Description
Height	Size of the vertical dimension, in pixels.
Width	Size of the Horizontal dimension, in pixels.
Bit depth	Number of bits used to represent the intensity values. DAAAC uses an internal 16-bit representation for all grayscale data greater than 8 bits. Data from a 10-bit camera, for example, will be auto-converted to 16-bit data.
Number of unique colors	Total number of unique colors or intensity levels present in the image.
X min	Minimum scaled (not necessarily pixel) value on the horizontal axis.
X max	Maximum scaled (not necessarily pixel) value on the horizontal axis.
Y min	Minimum scaled (not necessarily pixel) value on the vertical axis.
Y max	Maximum scaled (not necessarily pixel) value on the vertical axis.
Z min	Minimum intensity value. Will be blank for color images.
Z max	Maximum intensity value. Will be blank for color images.
Figures of merit	Name and values of all computed Figures of Merit.

2.4.4.3.4 How Accessed

- Click on an image plot, then File->Properties
- Click on an image plot, right-click, then select Properties… from the popup menu.

2.4.4.4 Labels Page

2.4.4.4.1 Dialog
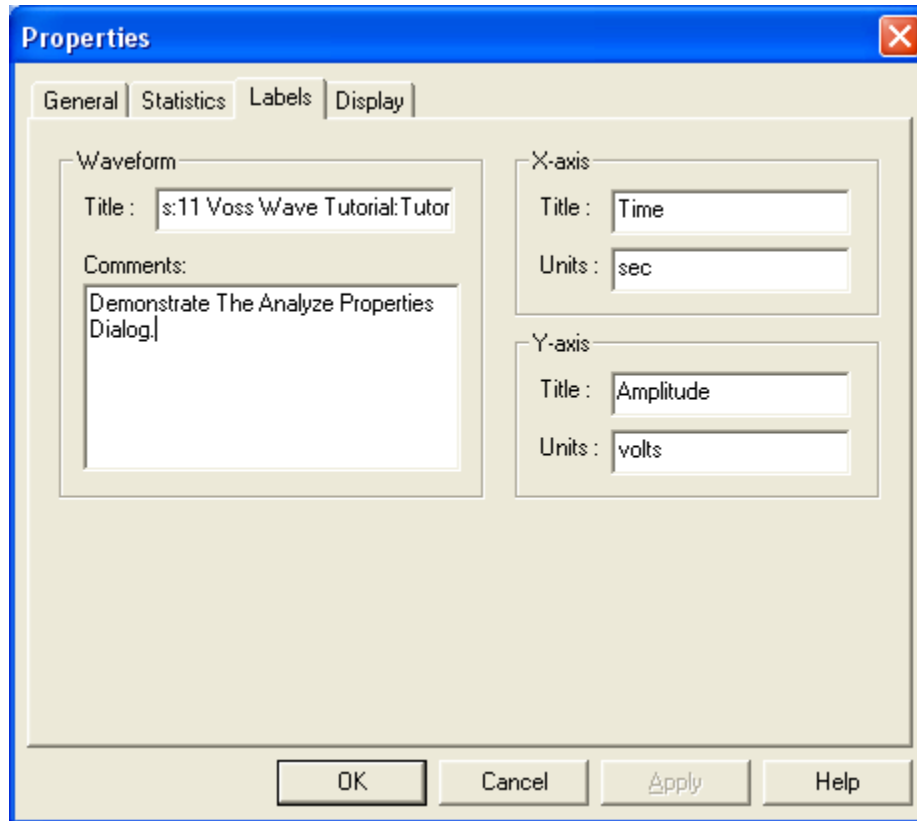
Figure 2-75 - Properties Dialog - Labels Tab

2.4.4.4.2 Discussion

The Labels page of the Properties dialog displays and configures the current title, axis labels, and comments. Changes made to fields in this dialog are updated on the current waveform, but for the changes to become permanent, the waveform must be stored to the database.

2.4.4.4.3 Details

Item	Description
Title	The current waveform title. This may be changed to any value.
Comments	Enter and edit comments for the waveform. These comments can be displayed at the top left corner of the waveform.
	If the waveform is a processed waveform, produced from auto reduction, and the Cal Item is a User Process, then the macro operations for that Cal Item are listed in this field as comments.
X-axis Title	The independent axis title.
X-axis Units	The independent axis unit of measure.
Y-axis Title	The dependent axis title.

Y-axis Units   The dependent axis unit of measure.

2.4.4.4.4   How Accessed
- Click on a waveform plot, then File->Properties
- Click on an waveform plot, right-click, then select Properties… from the popup menu.

2.4.4.5   Image Titles

2.4.4.5.1   Dialog
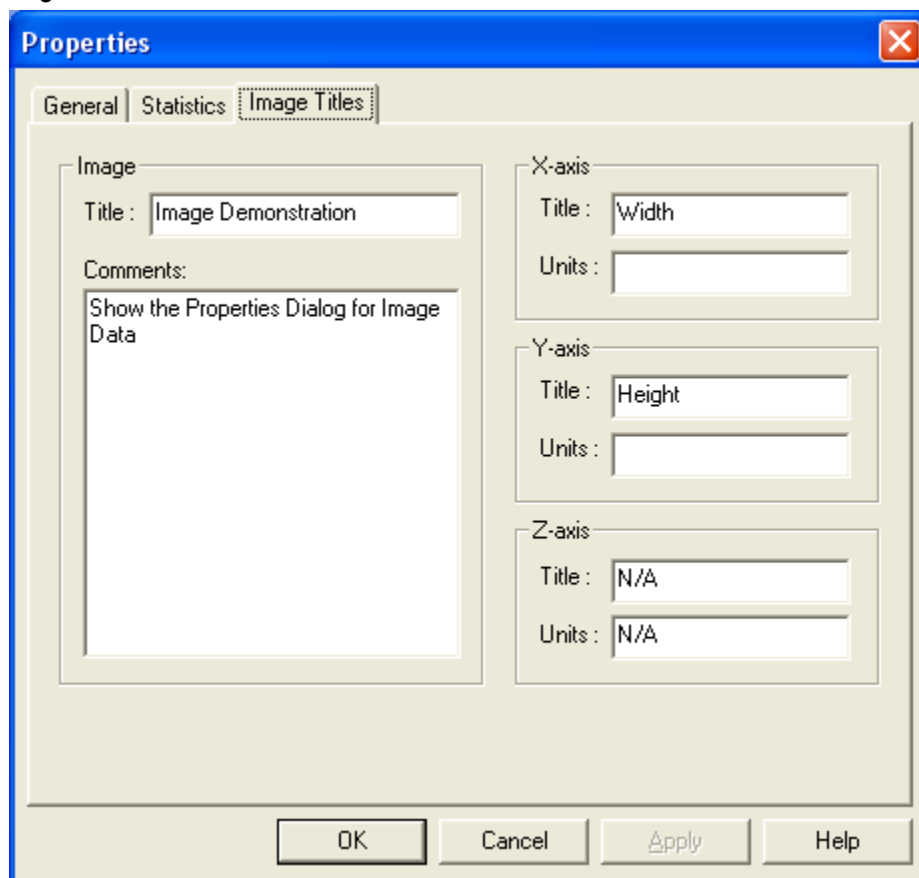
Figure 2-76 - Properties Dialog - Titles Tab - Image Data

2.4.4.5.2   Discussion

The Labels page of the Properties dialog displays and configures the current title, axis labels, and comments. Changes made to fields in this dialog are updated on the current image, but for the changes to become permanent, the image must be stored to the database.

2.4.4.5.3   Details

Item	Description
Title	The current waveform title. This may be changed to any value.
Comments	Enter and edit comments for the image. These comments can be displayed at the top left corner of the waveform.

X-axis Title   The horizontal axis title.

X-axis Units   The horizontal axis unit of measure.

Y-axis Title   The vertical axis title.

Y-axis Units   The vertical axis unit of measure.

Z-axis Title   The dependent axis title.

Z-axis Units   The dependent axis unit of measure.

2.4.4.5.4   How Accessed
- Click on an image plot, then File->Properties
- Click on an image plot, right-click, then select Properties… from the popup menu.

2.4.4.6   Details Page

2.4.4.6.1   Dialog
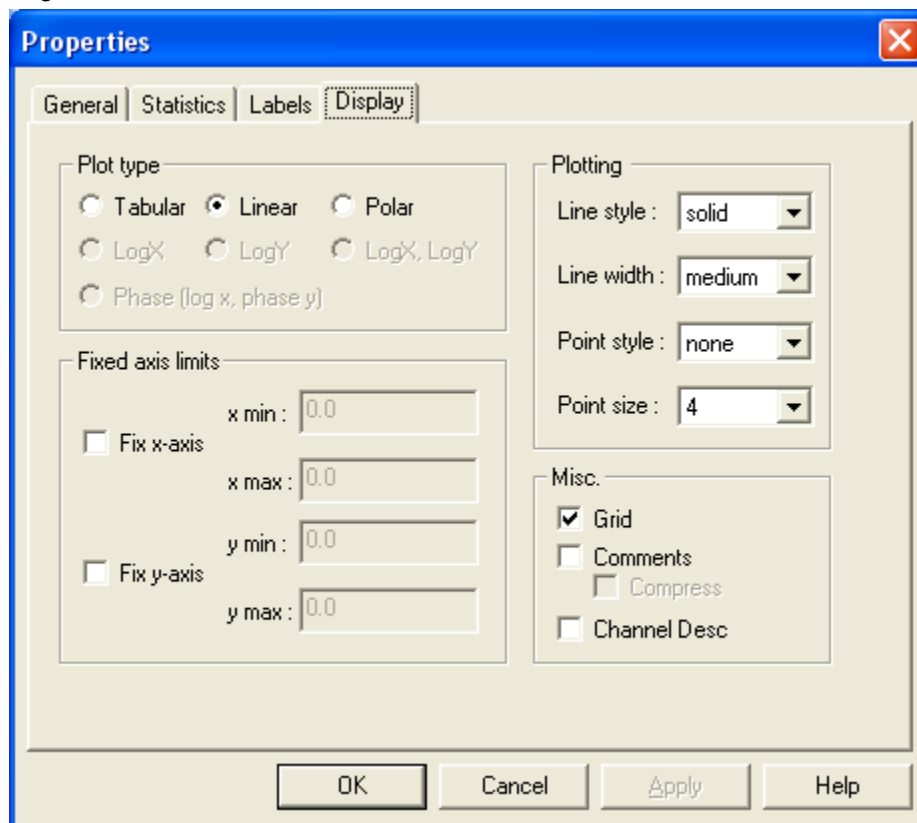
Figure 2-77, - Properties Dialog - Display Tab (Waveform Only)

2.4.4.6.2   Discussion

The Display Options page of the Properties dialog selects the waveform display options. Waveforms can be displayed as a Cartesian plot or in tabular format. If displayed as a plot, you can select fixed limits for the *x* or *y* axis. The fixed axis limits affect the display only, and remain in effect until turned off.

2.4.4.6.3 Details

Item	Description
Tabular	Data is displayed in tabular format as x/y pair floating point numbers.
Linear	Data is displayed graphically as a waveform.
LogX	Log display of the x-axis only.
LogY	Log display of the y-axis only.
LogX, LogY	Log display of both x and y axes.
Phase	Enabled for network analyzer data only, with log scale for the x-axis and +/- 180 degrees for the y-axis.
Fix x-axis	When checked, the specified x min and x max limits are applied to the waveform. Valid limits should be entered in the x min and x max fields before this option is applied. Because the waveform display uses round values, the limits entered may be rounded.
x min	The x min value for the waveform. The waveform's x-axis display minimum will be set to this number, regardless of the actual data limits.
x max	The x max value for the waveform. The waveform's x-axis display maximum will be set to this number, regardless of the actual data limits.
Fix y-axis	When checked, the specified y min and y max limits are applied to the waveform. Valid limits should be entered in the y min and y max fields before this option is applied. Because the waveform display uses round values, the limits entered may be rounded.
y min	The y min value for the waveform. The waveform's y-axis display minimum will be set to this number, regardless of the actual data limits.
y max	The y max value for the waveform. The waveform's y-axis display maximum will be set to this number, regardless of the actual data limits.

2.4.4.6.4 How Accessed

- Click on a waveform plot, then File->Properties
- Click on an waveform plot, right-click, then select Properties… from the popup menu.

2.4.4.7 Overlay Labels Page

2.4.4.7.1 Dialog
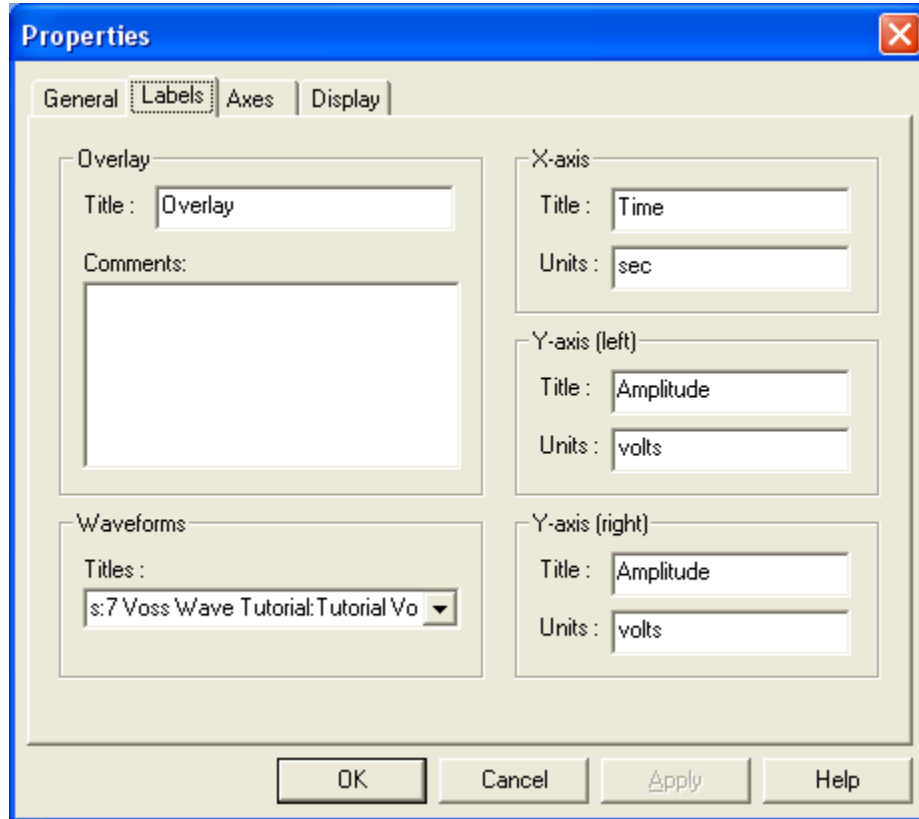
Figure 2-78 - Properties Dialog - Labels Tab - Overlay Data.

2.4.4.7.2 Discussion

The Overlay Labels page of the Properties dialog displays and configures the current title, axis labels and comments. Changes made to fields in this dialog are updated on the current waveform, but the waveform must be stored to the database for the changes to become permanent.

2.4.4.7.3 Details

Item	Description
Title	The current overlay title. This may be changed to any value.
Comments	Enter and edit comments for the waveform. These comments can be displayed at the top left corner of the waveform.
Waveform titles	Titles for the individual waveforms in the overlay. Modifying these titles will update the titles in the overlay legend.
X-axis Title	The independent axis title.
X-axis Units	The independent axis unit of measure.
Y-axis (left) Title	The left dependent axis title.

Y-axis (left) Units	The left dependent axis unit of measure.
Y-axis (right) Title	The right dependent axis title.
Y-axis (right) Units	The right dependent axis unit of measure.

2.4.4.7.4   How Accessed
- Click on an overlay plot, then File->Properties
- Click on an overlay plot, right-click, then select Properties… from the popup menu.

2.4.4.8   Overlay Axes Page

2.4.4.8.1   Dialog
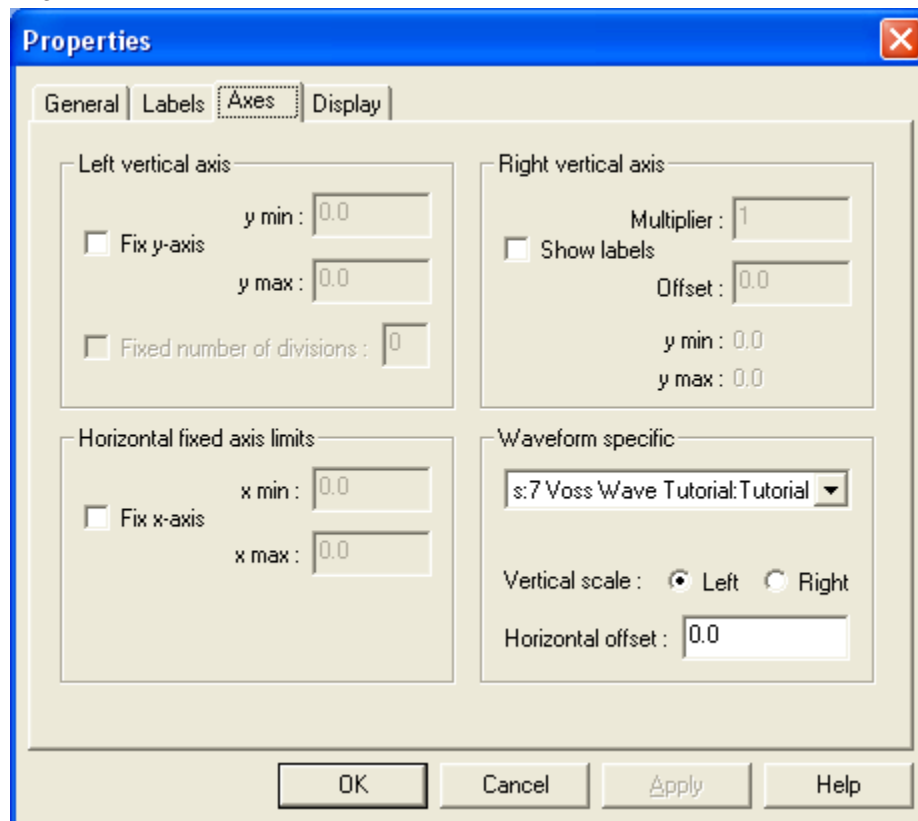
Figure 2-79 - Properties Dialog - Axes Tab (Overlay Only).

2.4.4.8.2   Discussion

The Overlay Display Options page of the Properties dialog selects the overlay waveform display options. The options configured below affect the display only, and remain in effect until they are turned off.

2.4.4.8.3 Details

Item	Description
Fix y-axis	When selected, the values in the y min and y max fields are applied as limits to the waveform display. Because the waveform display uses round values, the limits entered may be rounded.
y min	The minimum y axis value to display on the left axis.
y max	The maximum y axis value to display on the left axis.
Fix x-axis	When selected, the values in the x min and x max fields are applied as limits to the waveform display. Because the waveform display uses round values, the limits entered may be rounded.
x min	The minimum x axis value to display.
x max	The maximum x axis value to display.
Show labels	When selected, shows y axis labels on the left side of the graph.
Multiplier, Offset	The multiplier and offset are applied directly to the left axis limits to create the limits for the right axis.
Waveform	Selects the waveform to be configured.
Vertical scale	Select left or right to display the waveform using the left or right axis scale.
Horizontal offset	X-axis offset for shifting the waveform display (commonly used to view waveforms recorded at different times).

2.4.4.8.4 How Accessed

- Click on an overlay plot, then File->Properties
- Click on an overlay plot, right-click, then select Properties… from the popup menu.

2.4.4.9 Overlay Display Page

2.4.4.9.1 Dialog
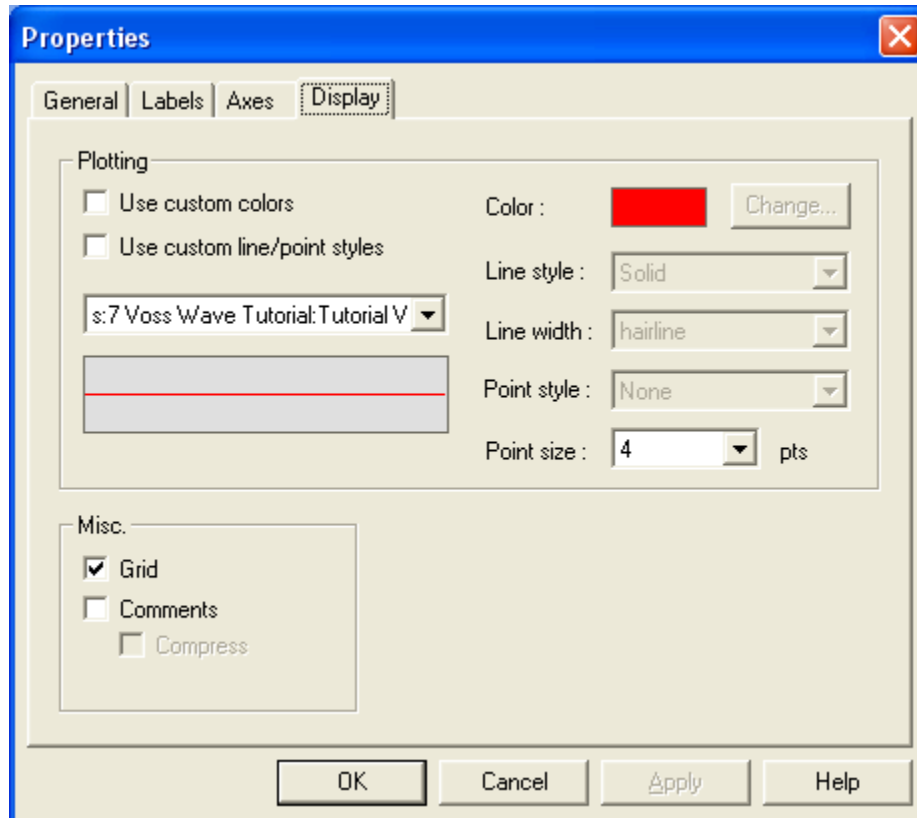
Figure 2-80 - Properties Dialog - Display Tab (Overlay).

2.4.4.9.2 Discussion

2.4.4.9.3 Details

Item	Description
Use custom colors	When checked, allows the user to assign a color to the plot shown in Waveform Selection (Unlabeled). The selected color will be updated in Waveform Preview (Unlabeled). When checked Color: is enabled, otherwise the control is disabled and colors are assigned automatically to all traces.
Use custom line/point styles	When checked, allows the user to assign a line style, line width and point style to the plot shown in Waveform Selection (Unlabeled). The selected styles will be updated in Waveform Preview (Unlabeled). When checked Line style:, Line width: and Point style: are enabled, otherwise the controls are disabled and styles are assigned automatically to all traces.
Waveform Selection (Unlabeled)	Select, by name, the waveform to be reviewed and/or adjusted.
Waveform Preview (Unlabeled)	Shows a sample of the appearance of the trace selected in Waveform Selection (Unlabeled). The appearance is updated as properties are selected for adjustment.

Color:	Opens a color dialog to assign a user-selected color to the waveform selected in Waveform Selection (Unlabeled). The color is updated in Waveform Preview (Unlabeled). This control is disabled unless Use custom colors is checked.
Line style:	Assign one of the following line styles to the waveform named in Waveform Selection (Unlabeled):

- Solid
- Dash
- Dot
- Long Dash
- Dash Dot
- Dash Dot Dot
- Dash Dash Dot
- Dash Dash Dot Dot

Once the line style is adjusted the change is reflected in Waveform Preview (Unlabeled). This control is disabled unless Use custom line/point styles is checked.

Line width:	Assign one of the following line weights to the waveform named in Waveform Selection (Unlabeled):

- Hairline
- Thin
- Medium
- Thick

Once the line weight is adjusted the change is reflected in Waveform Preview (Unlabeled). This control is disabled unless Use custom line/point styles is checked.

Point style:	Assign one of the following point styles to the waveform named in Waveform Selection (Unlabeled):

- None
- Circle
- Square
- Triangle
- Diamond
- Cross
- X

Once the point styles is adjusted the change is reflected in Waveform Preview (Unlabeled). This control is disabled unless Use custom line/point styles is checked.

Point size:	Adjust the dimensions of the point style selected for the trace in Waveform Selection (Unlabeled). The adjustment is reflected in the preview.
Grid	Show or hide plot grid lines
Comments	Displays any waveform comment text above the plot area.
Compress	Replaces any newline characters in the waveform comment with spaces when displaying

- Click on an overlay plot, then File->Properties
- Click on an overlay plot, right-click, then select Properties… from the popup menu.

2.4.5   Print Title

2.4.5.1   Dialog
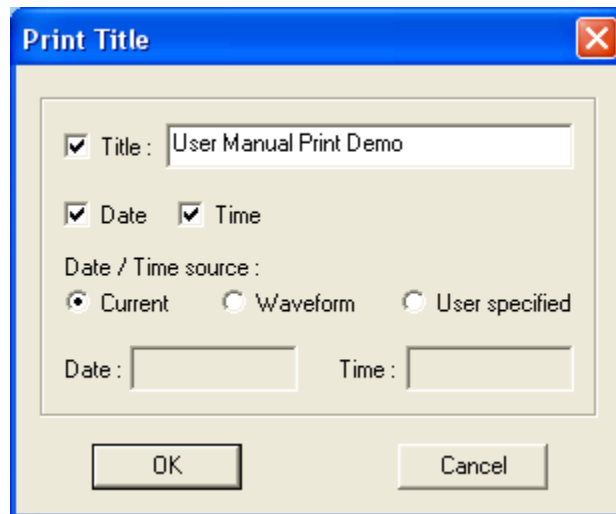
Figure 2-81 - Analyze Print Configuration Dialog.

2.4.5.2   Discussion

The dialog controls the inclusion of a title and date and/or time stamp in the printout.

2.4.5.3   Details

Item	Description
Title:	When checked, the text typed into Title (Unlabeled) will be written to the top of the printout.
Title (Unlabeled)	Text that will be written to the top of the printout if Title: is checked.
Date	Check to print a date stamp on the document. If this control and/or Time is checked, Current, Waveform and User specified will be enabled. Otherwise all will be disabled.
Time	Check to print a time stamp on the document. If this control and/or Date is checked, Current, Waveform and User specified will be enabled. Otherwise all will be disabled.
Current	If Date and/or Time is checked, selecting this will cause the printout date and/or time to be printed on the document. This control is disabled if both Date and Time are unchecked.
Waveform	If Date and/or Time is checked, selecting this will cause the waveform capture date and/or time to be printed on the document. This control is disabled if both Date and Time are unchecked.

User specified   If Date and/or Time is checked, selecting this will cause the a date and/or time specified by the user to be printed on the document. This control is disabled if both Date and Time are unchecked. If this is selected, Date: and Time: are enabled. Otherwise they are disabled.

Date: User-entered date value to be printed on the document. This control is enabled only if Date is checked and User specified is selected.

Time: User-entered time value to be printed on the document. This control is enabled only if Time is checked and User specified is selected.

2.4.5.4   How Accessed

- File->Print…
- <Ctrl-P>

2.4.6   Display Options

2.4.6.1   Waveform

2.4.6.1.1   Dialog
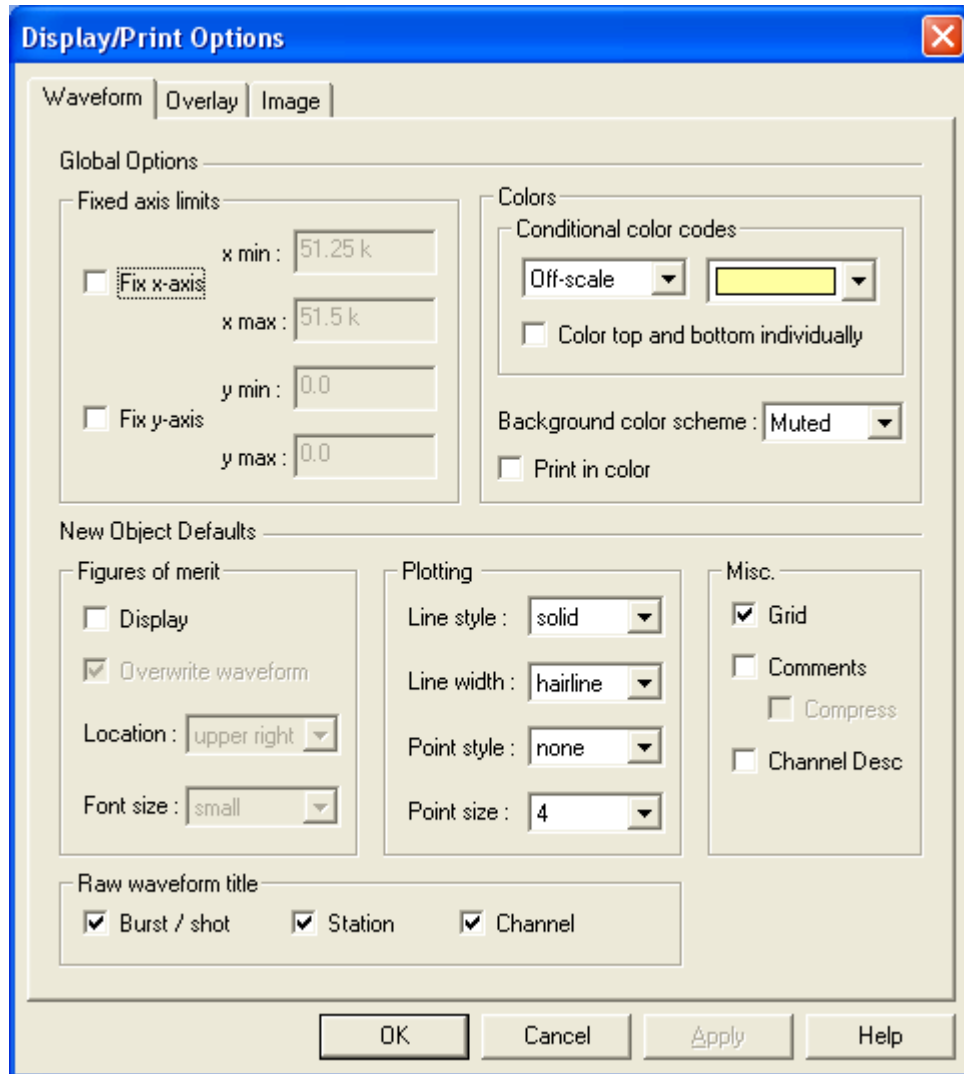
Figure 2-82 - Waveform Display Options

2.4.6.1.2   Discussion

    The Waveform Display Options dialog configures the global display and print options for waveforms.

2.4.6.1.3   Details

Item	Description
Global Options	Changes to these options are applied immediately to all currently displayed wave-forms.

Fix x-axis	When checked, the specified x min and x max display limits are globally applied to all waveforms. Valid limits should be entered in the x min and x max fields before this option is applied.
x min	The x min value for the waveform. The waveform's x-axis display minimum will be set to this number, regardless of the actual data limits.
x max	The x max value for the waveform. The waveform's x-axis display maximum will be set to this number, regardless of the actual data limits.
Fix y-axis	When checked, the specified y min and y max display limits are globally applied to all waveforms. Valid limits should be entered in the y min and y max fields before this option is applied.
y min	The y min value for the waveform. The waveform's y-axis display minimum will be set to this number, regardless of the actual data limits.
y max	The y max value for the waveform. The waveform's y-axis display maximum will be set to this number, regardless of the actual data limits.
Conditional color codes	Allows selection of color-coding for off-scale, out-of-spec, or weak data. The off-scale condition supports individual top and bottom coloring – the top half of the window will be colored if the data is off-top and the bottom half of the window will be colored if the data is off-bottom.
Background color scheme	Selects the color scheme for the plot background. Off displays no background color; Muted displays color codes based on the data type and error conditions.
Print in color	Print waveforms using color for both the plot and the background (only applies to color printers). Printed colors will match the displayed colors.
New Object Defaults	Items in this section affect newly created waveforms, but do not affect waveforms that are already displayed. Many of these items can also be modified after the waveform is created by selecting Properties from the waveform's right-click menu.
FOMs, Display	When checked, selected Figures of Merit (FOMs) are displayed at the specified location on the waveform (see Location).
FOMs, Overwrite waveform	When checked, the FOMs are displayed after the waveform is displayed, overwriting any area of the waveform in the same area as the FOMs. When unchecked, the FOMs are displayed transparently. That is, the FOMs are displayed first, then the waveform is displayed. If the waveform exists in the area of a FOM, the waveform data will overwrite the FOM.
FOMs, Location	Selects the location on the waveform to display the FOMs. Choices are either upper or lower left or right.
FOMs, Font size	Selects the size of the font for the display FOMs. Choices are small, medium, large, and huge.
Line style	Selects the line style for the waveform plot. Choices are none, solid, dash, and dot.
Line width	Selects the line width for the waveform plot. Choices are hairline, thin, medium, and thick. Hairline is the default and is usually the best choice if the waveform contains many points. Medium or thick are useful for preparing presentation slides.
Point style	Selects the point style for the waveform plot. Choices are none, circle, square, triangle, diamond, cross, and X.

Point size	Selects the size for the display of data points in the waveform plot. Has no effect if the point style is none.
Grid	When checked, a grid is displayed with the waveform.
Comments	When checked, any comments entered in the Labels page of the Properties menu for the current waveform are displayed at the top left of the waveform frame. The comment line will be truncated if it exceeds one line.
Compress Comments	Replaces newline characters with commas when displaying the comment field. This action decreases the amount of vertical space required to display the comment, but can cause the comment text to be clipped horizontally.
Channel Desc	Displays the channel description (from the associated acquisition channel) above the plot area.
Raw waveform title	Raw waveforms in the database do not have an associated title, but when displayed they dynamically create a title from a combination of burst number, shot number, station name and channel name.
Burst / Shot-Raw	Display the burst or shot (or "burst.shot" in burst mode) in the raw waveform's title.
Station-Raw	Display the station name in the raw waveform's title.
Channel-Raw	Display the channel name in the raw waveform's title.

2.4.6.1.4 How Accessed

- Preferences->Display Options…

-

2.4.6.2   Overlay

2.4.6.2.1   Dialog
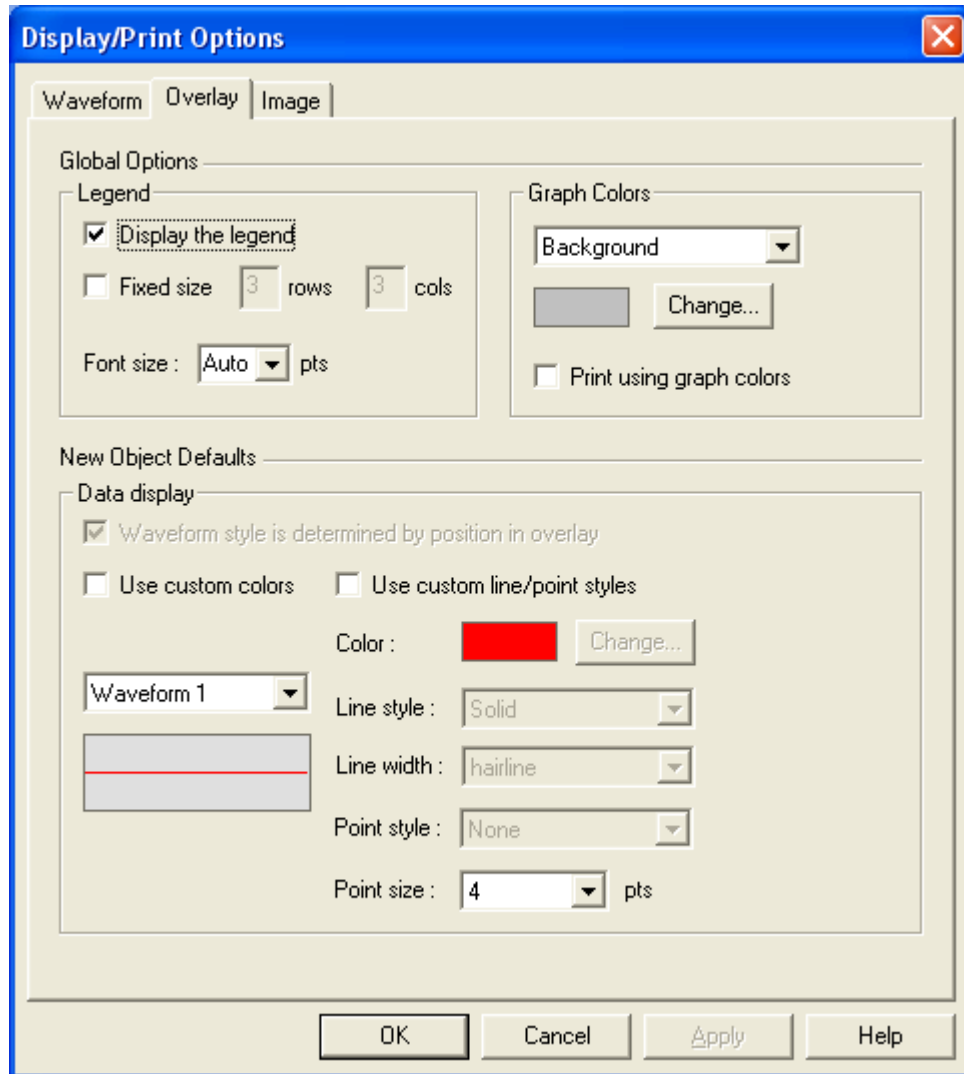
Figure 2-83 - Overlay Display Options

2.4.6.2.2   Discussion

The Overlay Display Options dialog configures the global display and print options for overlay waveforms. Changes to the Legend and Graph Colors settings are applied to all currently displayed overlays. Items in the Data Display group are used as the initial values when a new overlay is created. Modifying the Data Display values will not affect existing overlays.

Note: selection of custom line styles with large line widths can substantially increase the time required to render waveforms with large numbers (10,000 or more) of data points.

2.4.6.2.3   Details

Item	Description
Display legend	When checked, displays the legend at the bottom of an overlay plot.

Fixed size legend	When checked, fixes the size of the overlay legend to the specified number of rows. If unchecked, the legend will contain enough rows to accommodate all entries.
Graph colors	Configures the various background and border colors for the display.
Use graph colors when printing	If selected, the printed overlay will use the specified background and border colors (even if the printer does not support color). If not selected, the printed graph will use black borders and white backgrounds.
Waveform style is determined by position in overlay	Selecting this item causes the color and line style of overlay waveforms to be determined by their position in the overlay (e.g., the first waveform in the legend will always be red, the second will always be blue, etc.). If this item is not selected, then the color / line style is tied to the waveform data, not to its position in the overlay. If a new waveform is inserted in the overlay, the existing waveforms will change position in the overlay but will retain their original color and line style. This item can only be disabled if both custom colors and line styles are enabled. This mode only affects the display of running overlays, which are the only overlays that support waveform insertion.
Custom colors	Allows the user to define the colors for each waveform in an overlay. Uncheck to use the default color scheme.
Custom line styles	Allows the user to specify line styles and widths for each waveform in an overlay. Uncheck to use solid lines for all waveforms.
Change color	Configures the color for the currently selected waveform.
Line style	Configures the line style for the currently selected waveform.
Line width	Configures the line width for the currently selected waveform. Choices are hairline, thin, medium, and thick. Hairline is the default and is usually the best choice if the waveform contains many points. Medium or thick are useful for preparing presentation slides.

2.4.6.2.4 How Accessed

- Preferences->Display Options…

-

2.4.6.3   Image

2.4.6.3.1   Dialog
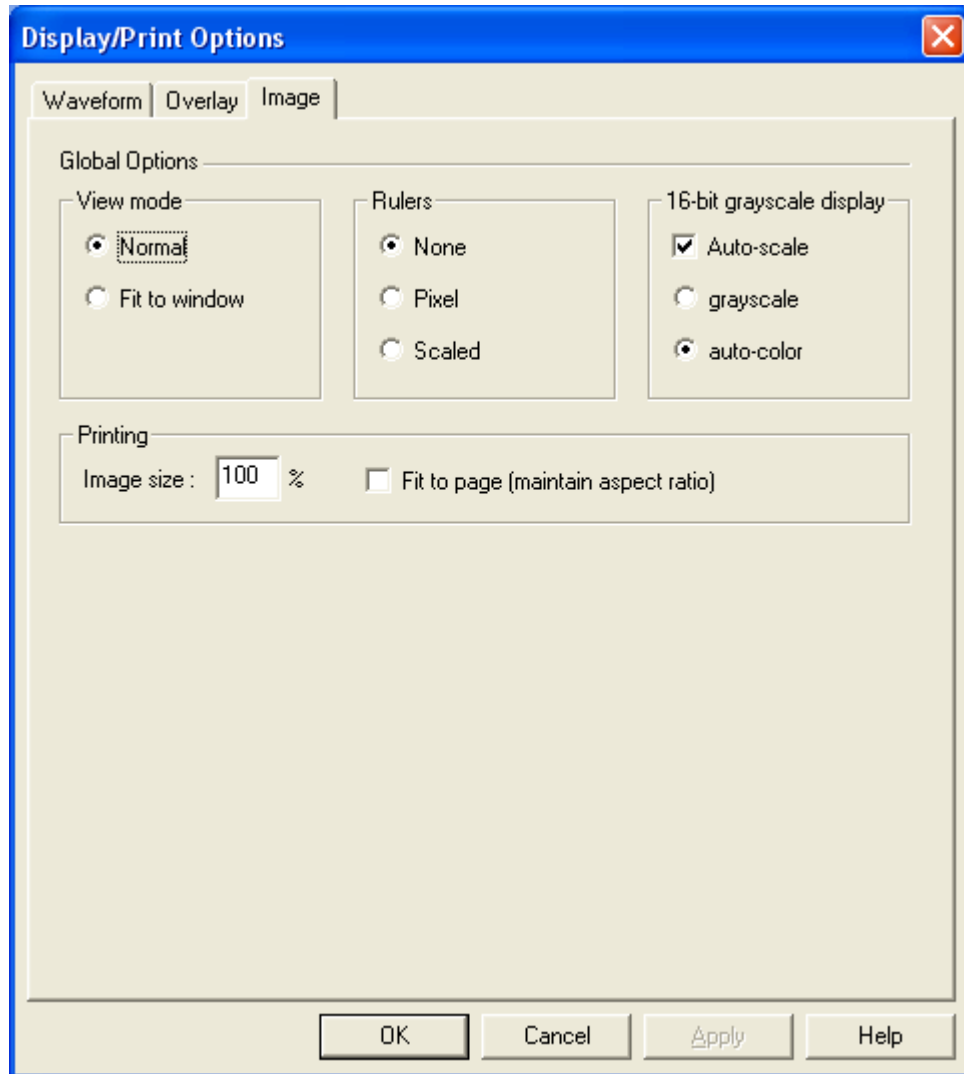
Figure 2-84 - Image Display Options

2.4.6.3.2   Discussion

The Image Options dialog configures the global display and print options for images. Changes to these options are applied to all currently displayed images.

2.4.6.3.3   Details

Item	Description
View mode	Normal – displays the image at its actual size, using scroll bars to provide access to the entire image if necessary.
	Fit to widow – scales the image to fit the size of the window, while maintaining the proper aspect ratio.
	In either mode, the image can be zoomed in or out. Fit to window mode is temporarily disabled whenever the image is not viewed at 100% of actual size.
Rulers	None – do not display rulers with the image.
	Pixel – display rulers using unscaled (pixel) units.
	Scaled – display rulers using scaled units.
	Rulers provide axis scales for the image. Unlike the waveform axis labels, the image's x-axis ruler is drawn at the top of the image. This is done because the first row of an image (row 0) is the top row, not the bottom row.Note: the ruler display is automatically turned off when the window size is not large enough to adequately display both the rulers and the image.
16-bit grayscale display	Auto-scale – when checked, uses either grayscale or color mapping to display all 16-bit grayscale images. This item has no effect on color images or on grayscale images that use less than 16-bits per pixel.
	Grayscale – scales the image's data range to use the full range of available grayscales. The minimum data value will be displayed as black, the maximum value as white.
	Auto-color – maps the data to a full color scale following the progression black, magenta, blue, cyan, green, yellow, red, white.
Printing	Image size – allows the image to be scaled for printing. Due to the high resolution of printers compared to monitors, the scale percentage will typically be much larger than 100% (e.g., a 600x600 pixel image would print at only 1"x1" on a 600 dpi printer with 100% scaling)
	Fit to page – scales the image to fill the printed page, while maintaining the proper aspect ratio.

2.4.6.3.4   How Accessed

- Preferences->Display Options…
-

2.4.7   FOM Selection

2.4.7.1   Dialog
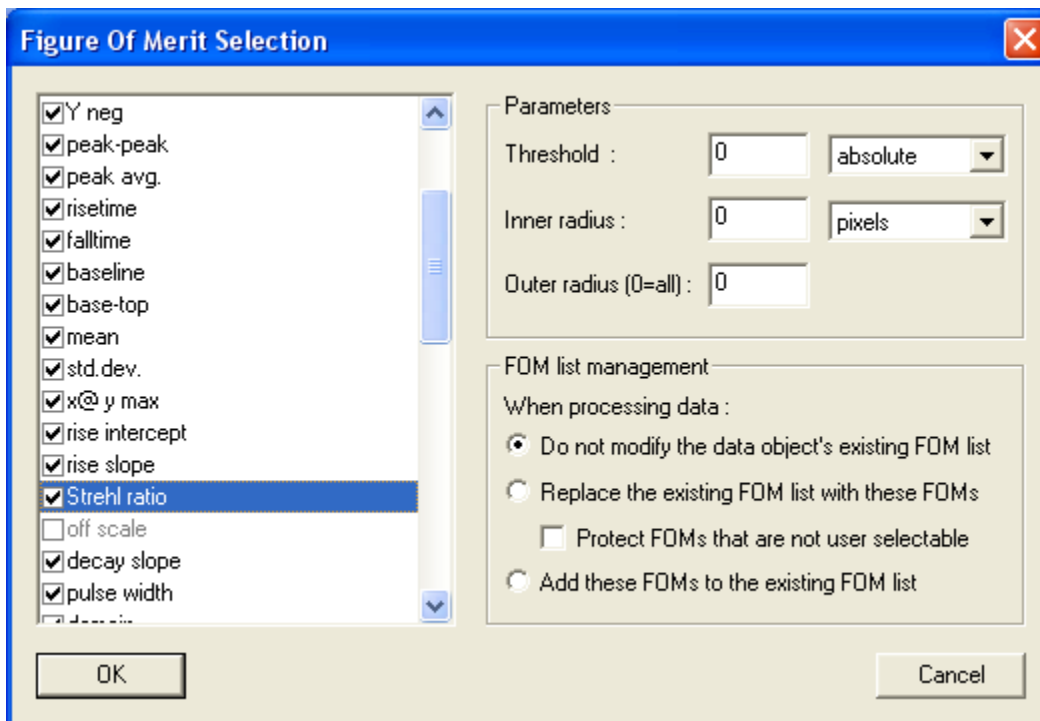
Figure 2-85 - Figure of Merit Selection.

2.4.7.2   Discussion

The Processed FOMs dialog box is used to global select the Figures of Merit (FOMs) that are computed when a manually processed waveform is created, or when an existing waveform is manually processed (from the Analyze module). The list of computed FOMs determines which FOMs are displayed with all waveforms, and which FOMs can be searched for when retrieving the waveform. Changing the FOM List has no effect on existing, processed waveforms. FOMs for automatically processed waveforms are selected in Cal Manager. FOMs for raw waveforms are selected globally in Acquire.

Three methods are available for using the selected FOMs:

- Do not modify an existing FOM list – If the waveform already has a FOM list, it will not be modified (i.e., the waveform's existing FOM values will be update to reflect the processing, but FOMs will not be added to or removed from the waveform's FOM list). Waveforms that do not have a FOM list will use the list specified in this dialog.
- Replace existing FOM list with these FOMs – Whenever a waveform is processed, its existing FOM list is deleted and the FOMs specified in this dialog are added. Some special FOMs, such as off-scale indicators and markers are automatically computed and are not user selectable. If Protect FOMs that are not user selectable is checked, these special FOMs are not deleted before adding the new FOMs.

- Add these FOMs to the existing list – In this case, any newly selected FOMs are appended to the waveforms existing FOM list. This mode protects all existing FOMs, while adding any new selections that were not already displayed.

Modification of the FOM list only affects displayed waveforms as they are created or processed in Analyze. Changes to the FOM list do not modify the FOMs associated with waveforms in the database.

2.4.7.3 How Accessed
- Preferences->Processed FOMs…

2.4.8 Process Waveform Data
This option opens a tabbed dialog that allows data operations to be applied directly and immediately to the selected waveform. An analogous dialog is available for image data as described in 2.4.9.

2.4.8.1 Calculator

2.4.8.1.1 Dialog
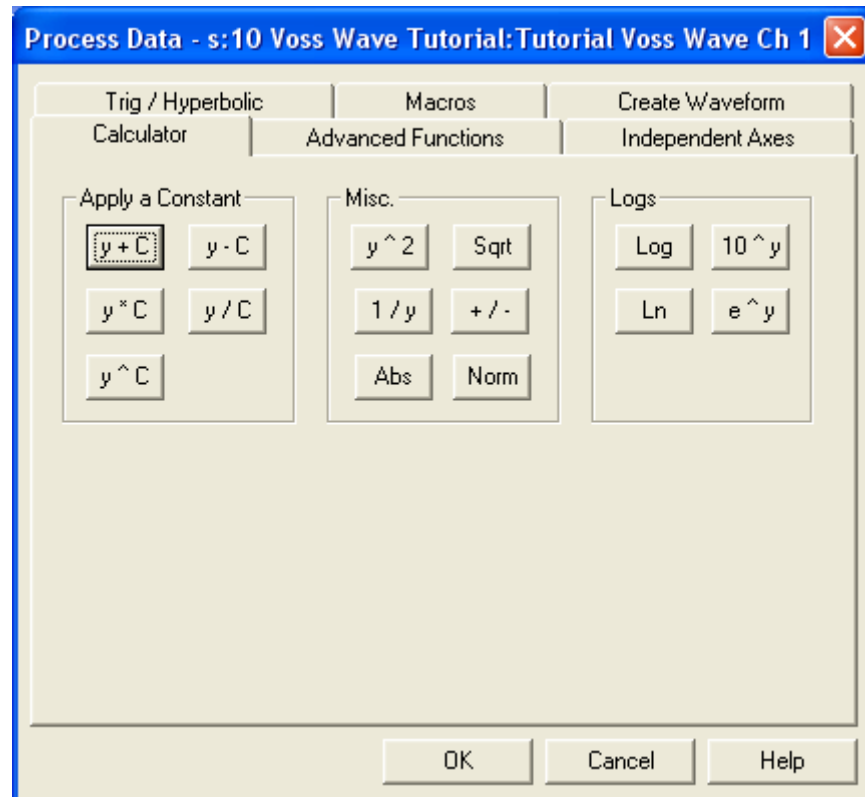
Figure 2-86 - Process Waveform Data - Calculator Tab

2.4.8.1.2 Discussion
The Calculator waveform processing page applies common calculator functions to the waveform (e.g., multiplication by a constant, logarithms, absolute value). Operations on this

page are immediately applied to the active waveform. To undo any applied operations, use Cancel on the Process Data property sheet.

2.4.8.1.3   Numeric Entry subdialog

2.4.8.1.3.1 Dialog
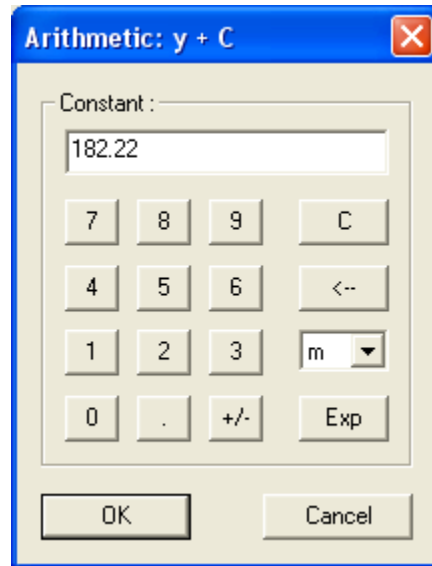
Figure 2-87 - Waveform Processing – Numeric Entry Subdialog.

2.4.8.1.3.2 Discussion

The Numeric Entry dialog supplies a constant value required for several operations. The dialog's title bar indicates which operation the constant is for. The constant can be entered using the calculator style buttons, or it can be typed directly into the edit field. Constants can be entered with an exponent (e.g., 2.4e-3 for 2.4 x 10-3) or with engineering suffixes (e.g., 2.4m for 2.4 x 10-3).

2.4.8.1.3.3 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select any of the Apply a Constant operations.

2.4.8.2 Advanced Functions

2.4.8.2.1 Dialog
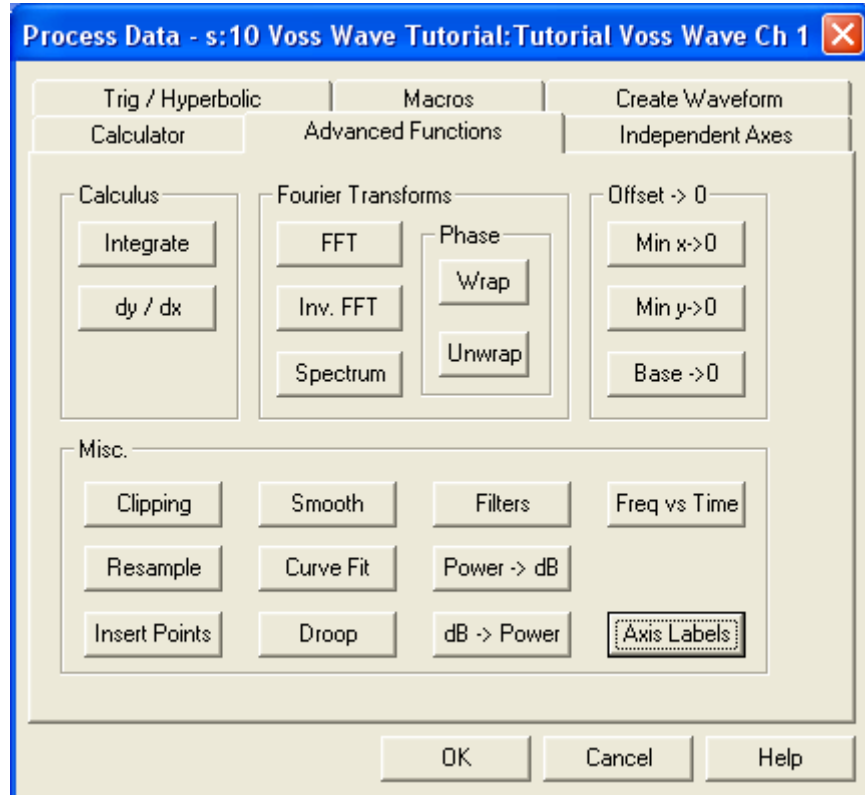
Figure 2-88 - Process Waveform Data - Advanced Functions Tab.

2.4.8.2.2 Discussion

The Advanced Functions waveform processing page applies advanced functions to the waveform, such as integration, FFTs, curve fits and filtering. Operations on this page are applied immediately to the active waveform. To undo any applied operations, use Cancel on the Process Data property sheet.

Note: The calculator subdialog presented in 2.4.8.1.3 is also accessible from the Advanced Functions tab by clicking Base -> 0 or Droop.

2.4.8.2.3 Integration Parameters subdialog

2.4.8.2.3.1 Dialog
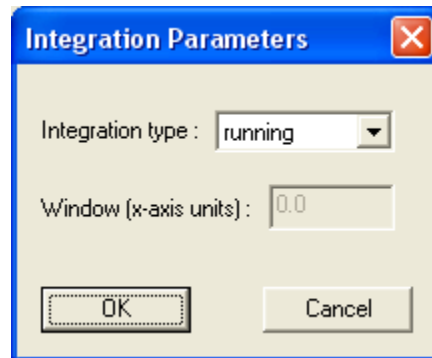
Figure 2-89 - Waveform Processing - Integration Parameters Subdialog.

2.4.8.2.3.2 Discussion

The Integration Parameters dialog specifies the type of integration performed:

- Running – each output point contains the integral of the waveform up to that point.

- Windowed – each output point contains the integral over a user specified window that is centered on the current point. The integration window is automatically clipped at the ends of the waveform. For example, assume a waveform starts at 0 seconds and has an integration window of 50 ms. The window at the 100 ms point will cover the full 50 ms (75 ms to 125 ms), but the integral at the 10 ms point will only cover 35 ms (0 s to 35 ms).

The trapezoidal method is used to perform the integration in both cases.

2.4.8.2.3.3 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Integrate.

2.4.8.2.4   FFT Options subdialog

2.4.8.2.4.1 Dialog

Figure 2-90 - Waveform Processing - FFT Subdialog.

2.4.8.2.4.2 Discussion

      The FFT dialog configures a Fast Fourier Transform (FFT) and its inverse. Select the input and output types to match the type of input waveform being processed and the desired output waveform (real, imag) or (mag, phase). DAAAC cannot automatically detect the input units. If the FFT dialog is being used to configure an FFT (not an inverse), the Window list will allow selection of an appropriate window type, which is applied before the FFT. Supported window types are Hanning, Parzen, and Welch.

2.4.8.2.4.3 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select FFT or Inv. FFT.

2.4.8.2.5   Wrap subdialog

2.4.8.2.5.1 Dialog
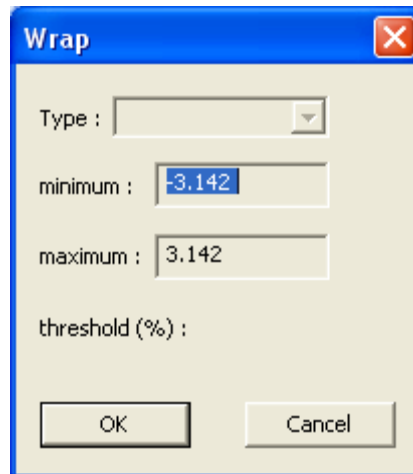
Figure 2-91 - Waveform Processing - Wrap Subdialog.

2.4.8.2.5.2 Discussion

2.4.8.2.5.3 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Wrap.

2.4.8.2.6   Unwrap subdialog

2.4.8.2.6.1 Dialog
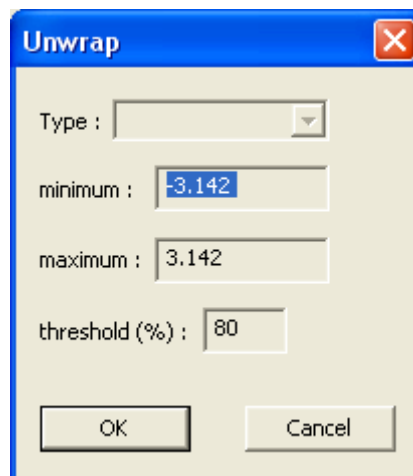
Figure 2-92 - Waveform Processing - Unwrap Subdialog.

2.4.8.2.6.2 Discussion

2.4.8.2.6.3 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Unwrap.

2.4.8.2.7   Clipping subdialog

2.4.8.2.7.1 Dialog
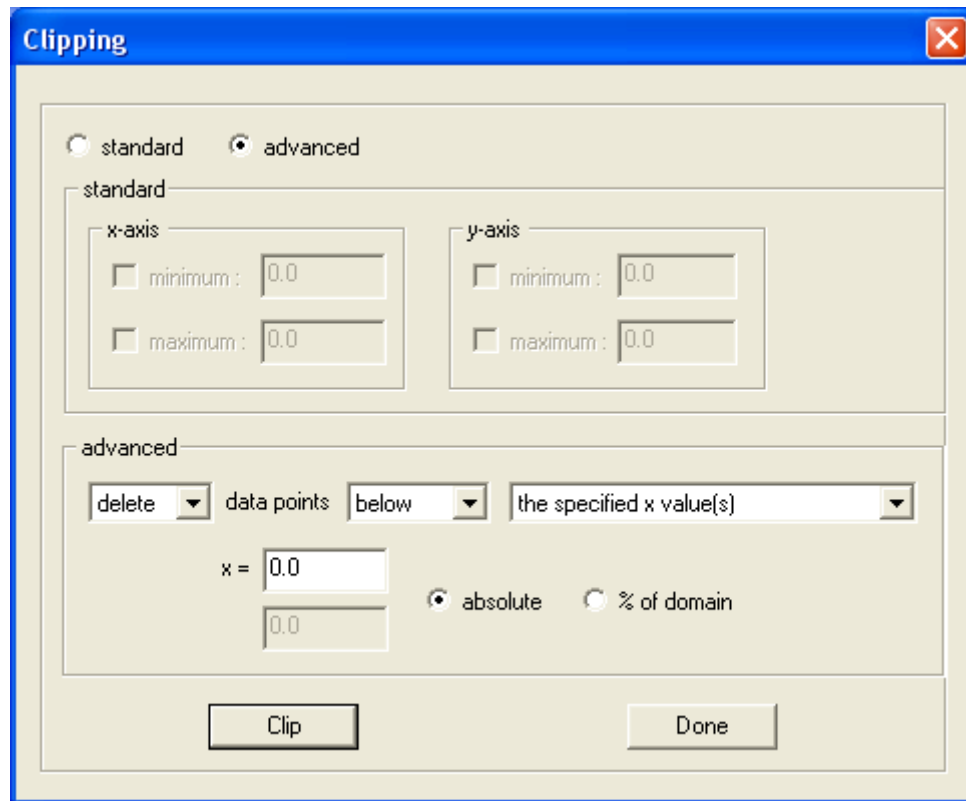
Figure 2-93 - Waveform Processing - Clipping Subdialog.

2.4.8.2.7.2 Discussion

The Clipping dialog removes, limits, or zeros the waveform data relative to the specified data values. Several options are providing for specifying which portion of the data to clip.

2.4.8.2.7.3 Details

Item	Description
Standard	Data is clipped based on simple x and y axis limits
Advanced	Clipping based on relative or absolute x or y values
x-axis minimum	remove all data points with x values less than the specified minimum
x-axis maximum	remove all data points with x values greater than the specified maximum
y-axis minimum	set all y values less than the specified minimum to the minimum value
y-axis maximum	set all y values greater than the specified maximum to the maximum value
advanced operation statement	uses three independent selections (operation, relationship, x / y criteria) to build a fully configurable clipping operation
delete, zero	selects the operation to be applied to the points that meet the criteria

below, above, between, outside	selects the relationship between the points to be operated on and the specified transition criteria
specified x value(s), the location of the specified y value(s)	selects an operation based on x value or y value criteria
x= , x at y=, min x=, min x at y=, max x=, max x at y=	clipping parameters that depend on the selection of the relationship and x / y criteria above
absolute / %	allows specification of transition points as an absolute number or as a % of a maximum waveform value

2.4.8.2.7.4 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Clipping.

2.4.8.2.8   Resample subdialog

2.4.8.2.8.1 Dialog
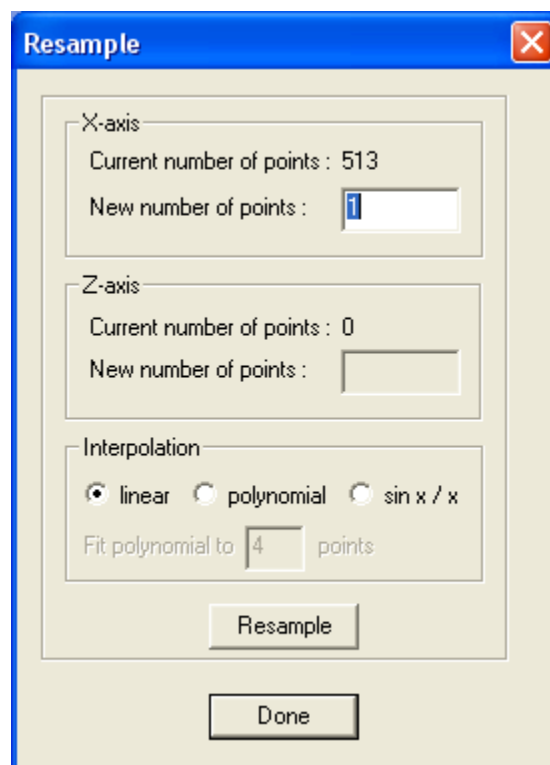
Figure 2-94 - Waveform Processing - Resample Subdialog.

2.4.8.2.8.2 Discussion

The Resample dialog changes the number of points in the active waveform. Select the new number of points and the interpolation type, then choose Resample. When the operation is complete, the dialog will be updated to show the new number of points.

2.4.8.2.8.2.1 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Resample.

2.4.8.2.8.3 Insert Points

2.4.8.2.8.3.1 Dialog
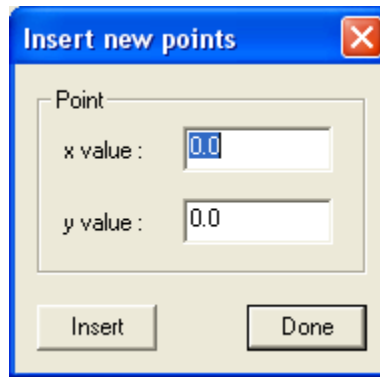
Figure 2-95 - Waveform Processing - Insert Points Subdialog .

2.4.8.2.8.3.2 Discussion

The Insert Points dialog inserts new points into the active waveform. Specify the x and y values and choose Insert to add a new point to the waveform. Points cannot be inserted at existing x locations.

2.4.8.2.8.3.3 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Insert Points.

2.4.8.2.8.4 Smoothing

2.4.8.2.8.4.1 Dialog
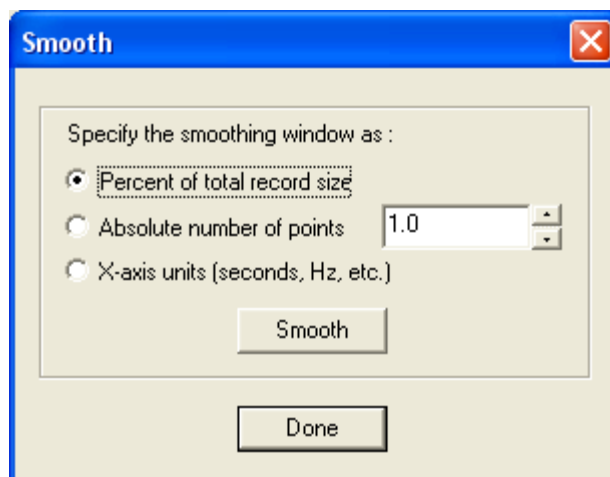
Figure 2-96 - Waveform Processing - Smoothing Subdialog.

2.4.8.2.8.4.2 Discussion

The Smooth dialog smoothes the active waveform. Specify the smoothing region as a percentage of the waveform, as an absolute number of points, or as a time (x-axis) window. The smoothing algorithm replaces each point with the average (no weighting) of the points in the smooth region.

2.4.8.2.8.5 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Smooth.

2.4.8.2.9   Curve Fit subdialog

2.4.8.2.9.1 Dialog
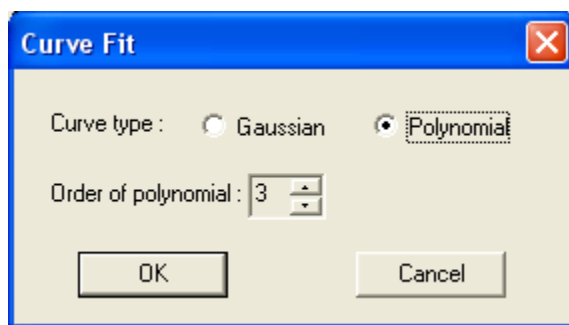
Figure 2-97 - Waveform Processing - Curve Fit Subdialog.

2.4.8.2.9.2 Discussion

Two curve types are available for fitting: Gaussian and Polynomial.

- Gaussian fit:
  The mean and variance of the x values are computed (each x value is weighted by its corresponding y value), and then used to plot a Gaussian distribution. This curve is then scaled to make the areas under the Gaussian and the original waveform equal. The original waveform is then replaced by the Gaussian. The mean and variance of the Gaussian curve are stored in the waveform's comment field.

  Note: The Gaussian fit is very sensitive to baseline offsets at the ends of the waveform. If the fit curve is shorter and broader than desired, try zeroing the baseline (see Advanced Functions property page) before performing the fit.

- Polynomial fit:
  Specify the order of the polynomial to fit to the data. The specified polynomial is created by performing a least squares fit to the waveform. The original waveform is then replaced by the fit polynomial. The coefficients of the resultant polynomial are stored in the waveform's comment field.

2.4.8.2.9.3 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Curve Fit.

2.4.8.2.9.4 Filter

2.4.8.2.9.4.1 Dialog
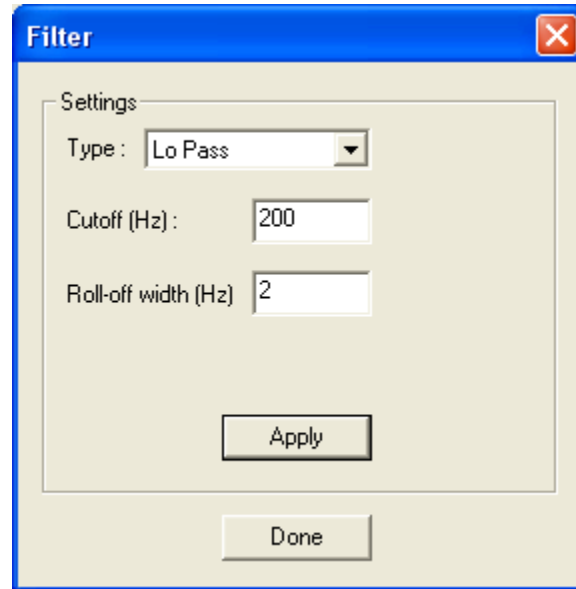
Figure 2-98 - Waveform Processing - Filter Subdialog.

2.4.8.2.9.4.2 Discussion

The Filter dialog selectively filters waveform data.

2.4.8.2.9.4.3 Details

Item	Description
Lo Pass	Converts the time domain waveform to the frequency domain, sets the amplitude of all points above the given pass frequency to zero, then converts the waveform back to the time domain. If the Roll-off width is greater than 0, a cosine function is used to gradually attenuate the frequency components. The data at Cutoff – (Roll-off width / 2) is not attenuated. The data at Cutoff is set to 50% of the original amplitude. The data at Cutoff + (Roll-off width / 2) is set to 0.
Hi Pass	Behaves like the Lo Pass filter, but removes content below the specified pass frequency.
Band Pass	Behaves like the Lo Pass filter, but removes content outside the specified frequency range.
Band Stop (Notch)	Behaves like the Lo Pass filter, but removes content inside the specified frequency range.
Level	Sets the y-values of each point to the average value of the current "level". Levels are defined as groups of collocated points whose point to point delta is less than the given threshold. Commonly used to remove noise from signals that contain data at discrete levels.
Threshold	Sets all y-values below the threshold level to zero. Commonly used to remove baseline noise prior to integration.

2.4.8.2.9.5 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Filter.

2.4.8.2.10 Frequency Vs Time subdialog

2.4.8.2.10.1Dialog
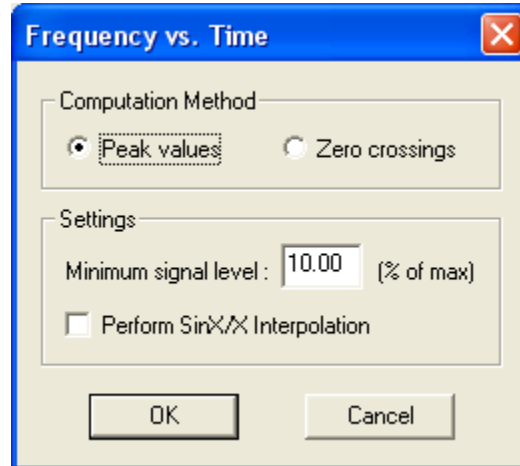
Figure 2-99 - Waveform Processing - Frequency vs. Time Subdialog.

2.4.8.2.10.2Discussion

The Axis Titles dialog is used to compute a frequency vs. time (FvsT) plot for a given sinusoidal waveform. FvsT can be computed by measuring the time from peak to peak or from zero-crossing to zero-crossing. The Minimum signal level field is used to select a waveform threshold for valid data. If the waveform does not reach the threshold between peaks (or zero-crossings), that portion of the signal is considered to be noise and is not used to compute a frequency value. Selection of Perform sinx/x interpolation will resample the waveform at 5x the number of points (using sinx/x interpolation) before computing the frequencies. The resulting FvsT waveform will replace the input sinusoidal waveform.

2.4.8.2.10.3How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Frequency vs. Time.

2.4.8.2.11 Axis Titles subdialog

2.4.8.2.11.1 Dialog
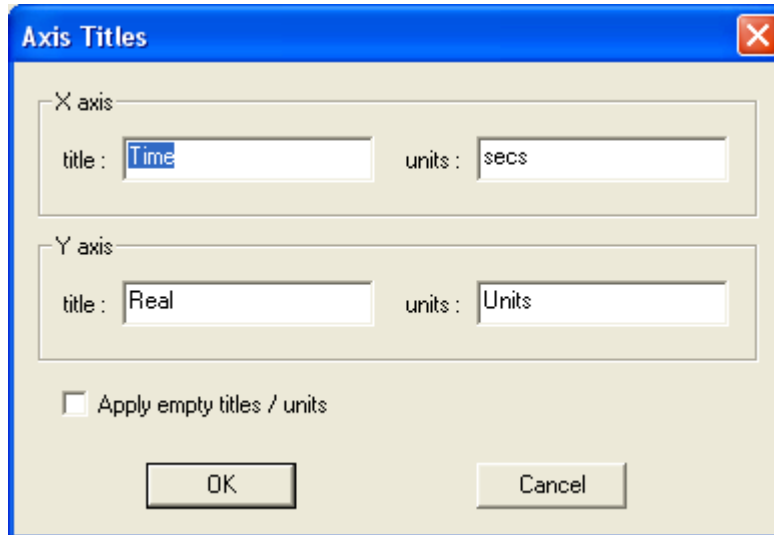
Figure 2-100 - Waveform Processing - Axis Labels Subdialog.

2.4.8.2.11.2 Discussion

      The Axis Titles dialog is used to select new axis titles and unit labels while processing a waveform. Enter the appropriate labels and select OK to update the waveform's titles and unit labels. To remove an existing title or unit label, enter an empty label (delete the existing label from the edit field) and select Apply empty titles / units before selecting OK. If Apply empty titles / units is not selected, only the fields containing text are applied to the waveform.

2.4.8.2.11.3 How Accessed

- Open the Process Data dialog Calculator tab (see 2.4.8.6.3), then select Axis Labels.

2.4.8.3   Independent Axes

2.4.8.3.1   Dialog
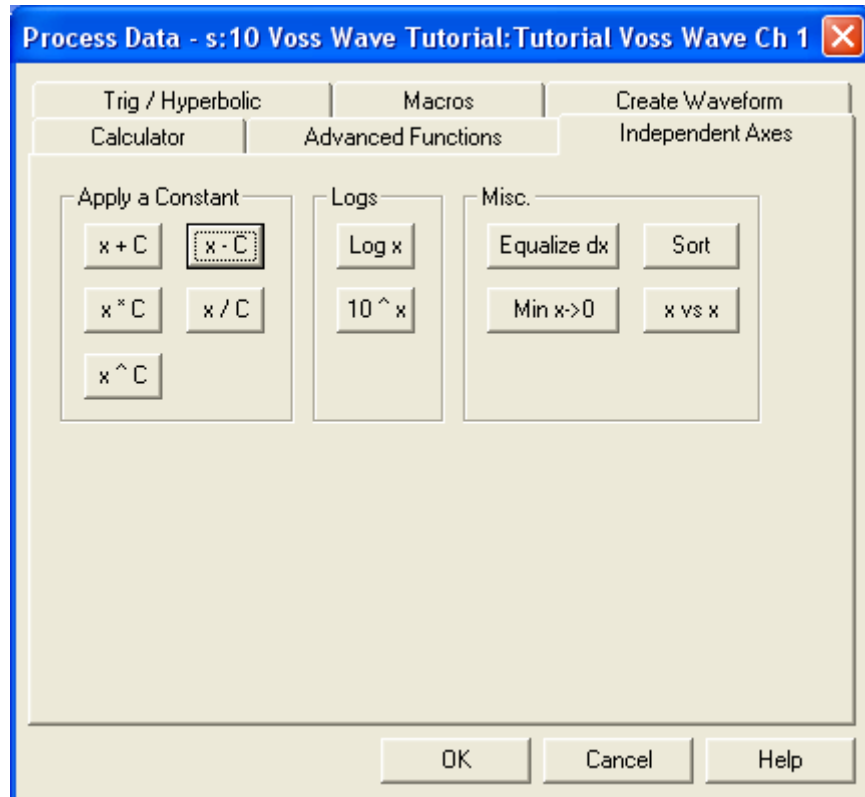
Figure 2-101 - Process Waveform Data - Independent Axes Tab.

2.4.8.3.2   Discussion

The Independent Axes waveform processing page processes the x values of the x,y pair data. Operations on this page are immediately applied to the active waveform. To undo any applied operations, use Cancel on the Process Data property sheet.

Note: The calculator subdialog presented in 2.4.8.1.3 is also accessible from the Independent Axes tab by clicking any of the Apply a Constant controls.

2.4.8.4 Trig/Hyperbolic

2.4.8.4.1 Dialog
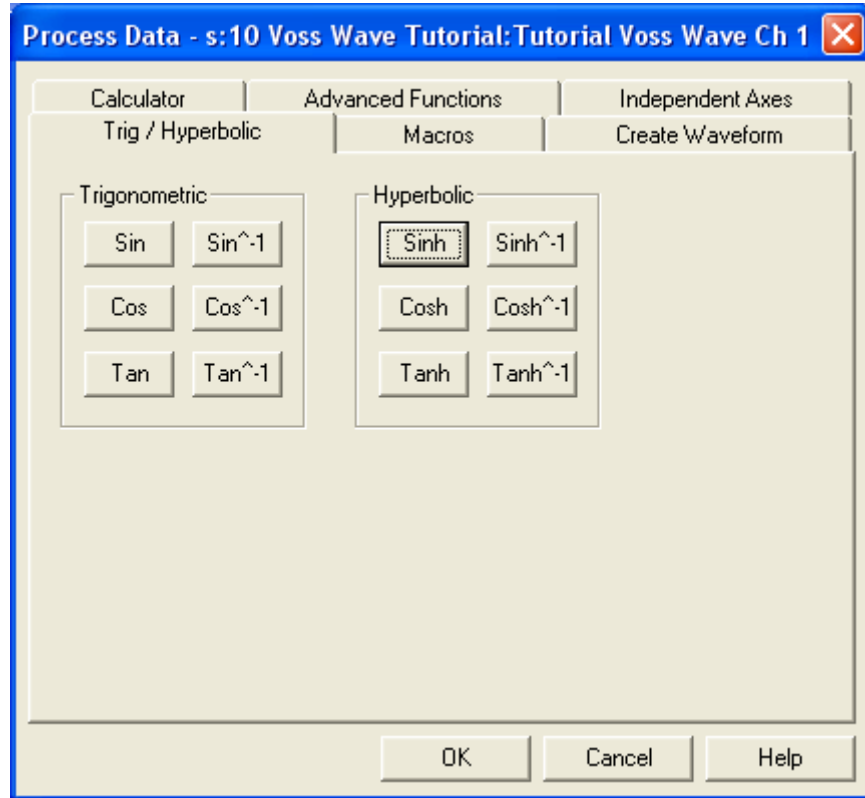
Figure 2-102 - Process Waveform Data - Trig/Hyperbolic Tab.

2.4.8.4.2 Discussion

The Trigonometry waveform processing page performs basic trigonometric functions on the waveform, such as sine, cosine, and tangent. Trigonometric operations are typically used to generate test waveforms or filters. Operations on this page are immediately applied to the active waveform. To undo any applied operations, use Cancel on the Process Data property sheet

2.4.8.5   Macros

2.4.8.5.1   Dialog
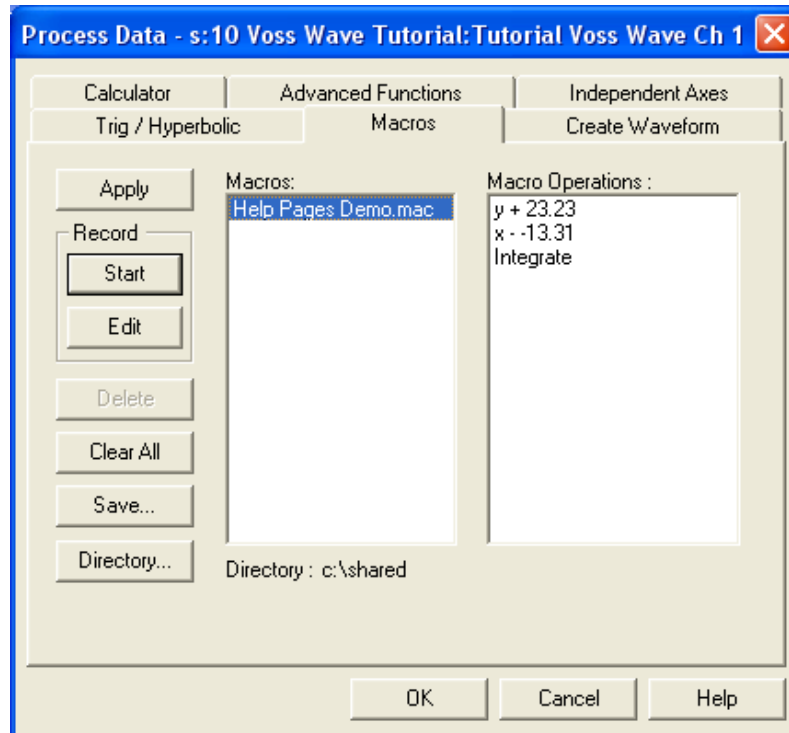
Figure 2-103 - Process Waveform Data - Macros Tab - Stopped.
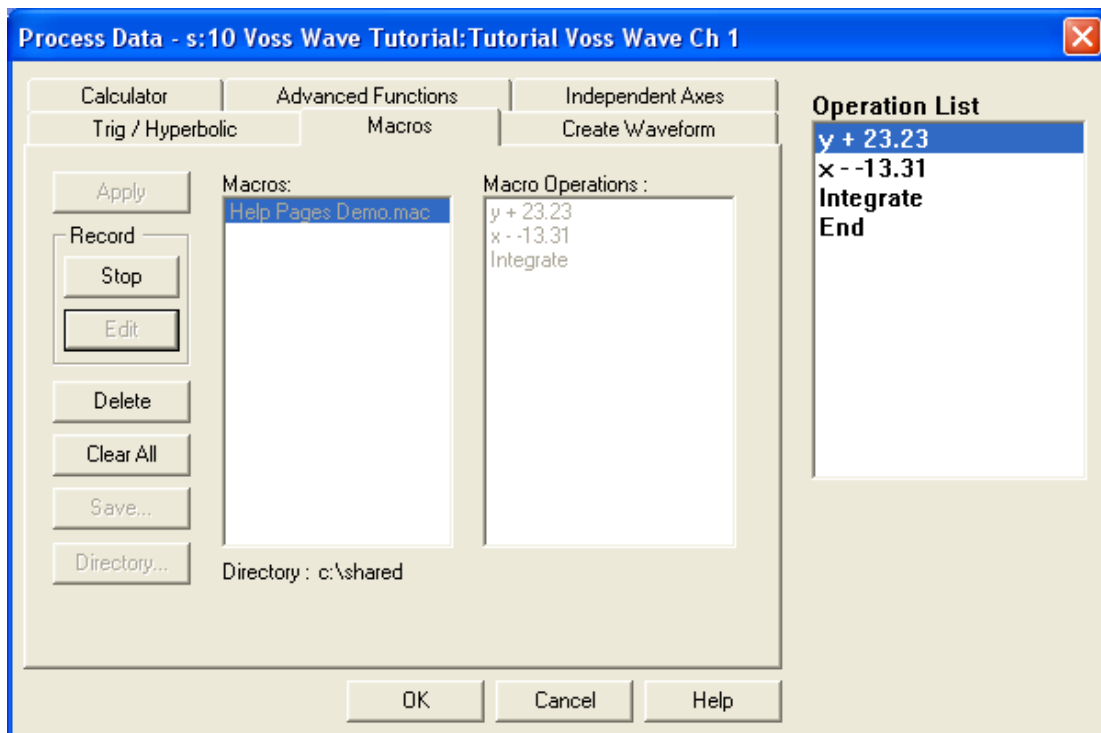
Figure 2-104 - Process Waveform Data - Macros Tab - Edit Mode.

2.4.8.5.2　Discussion

The Macro waveform processing page combines operations from the other processing pages into a single macro operation. Macros can be created, saved to files, read from files, and applied to the waveform from this page.

To create a macro, choose (Record) Start and the processing sheet will expand and display a list of operations with a single item called End (marks the end of the list). You can now go to any other page (except Create Waveform) and select an operation to include in the macro. New operations are always inserted before the highlighted operation in the list. When you are done recording, return to the macro page and choose (Record) Stop. A <new> entry will be placed in the list of available macros, and the macro definition will appear in the Macro Operations list.

Newly recorded macros are stored in temporary memory. You can apply the new macro to the waveform by choosing Apply, but if you select any other macro from the list, the new macro will be overwritten. To create a permanent macro, choose Save and specify a name. The macro will then appear in the list with the specified name.

To apply a stored macro, use the Directory button to select the macro definition directory. A list of available macros will appear in the Macro list. Select a macro from the list and choose Apply. The definition of the currently selected macro will appear in the Macro Operations list.

Each macro is stored as a separate binary file that can be copied or moved, or opened by any DAAAC module that supports macro operations. Use the Directory button to select the current macro directory.

Undo and Apply Last Operation - Macros are treated as atomic operations, i.e. Undo and Apply Last will undo or apply all of the operations included in the macro.

2.4.8.6   Create Waveform

2.4.8.6.1   Dialog

Figure 2-105 - Process Waveform Data - Synthetic Waveform Tab.

2.4.8.6.2   Discussion

The Create Waveform processing page creates a new waveform, such as one used as a filter or test waveform. Create Waveform typically is used to create a new waveform window, but also can replace the data in an existing waveform. The Create Waveform page is not accessible during macro recording. See 2.4.1 for additional detail.

2.4.8.6.3   How Accessed

Select any waveform data display, then…
- Analysis->Process…
-
- Right-click, then select Process… from the popup menu.

2.4.9   Process Image Data

2.4.9.1   Standard Processing

2.4.9.1.1   Dialog
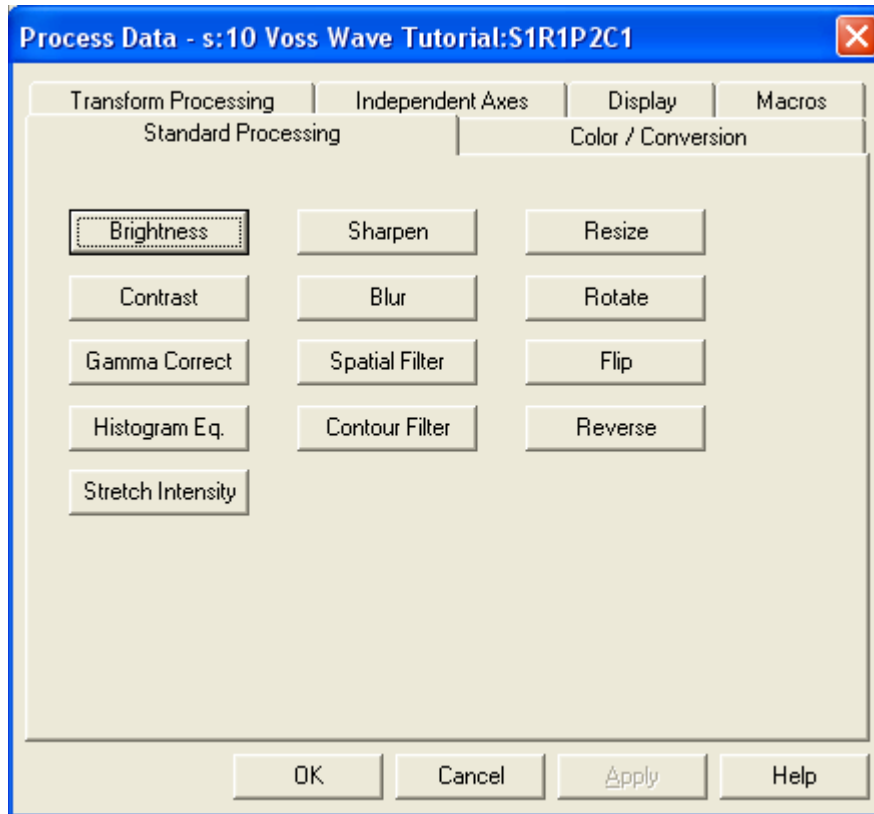
Figure 2-106 - Process Image Data - Standard Process Tab.

2.4.9.1.2   Discussion

The standard processing page includes the operations typically found in basic image processing applications. The majority of these operations are used to adjust the image itself, and are not for processing the underlying floating point data. Application of any operation on this page, with the exceptions of Resize, Flip and Reverse, will delete the associated floating point data, if present.

2.4.9.1.3 Brightness, Contrast, Gamma Correct, Sharpen, Blur subdialog

2.4.9.1.3.1 Dialog
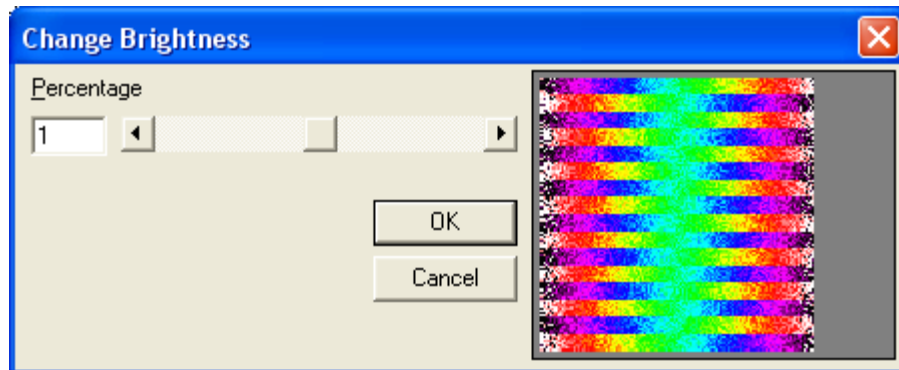
Figure 2-107 - Process Image Data - Standard Process Tab - Brightness Subdialog.

2.4.9.1.3.2 Discussion

The dialog of Figure 2-107 is specifically directed to adjusting the image brightness, but is the same interface for Contrast, Gamma Correction, Sharpen and Blur. The image is represented to the right and is updated as the change is applied. The parameter may be adjusted by either working the slide bar or typing directly into Percentage. Whichever control is used, the other control will be updated, along with the sample image, to reflect the change.

2.4.9.1.4 Spatial Filter subdialog

2.4.9.1.4.1 Dialog
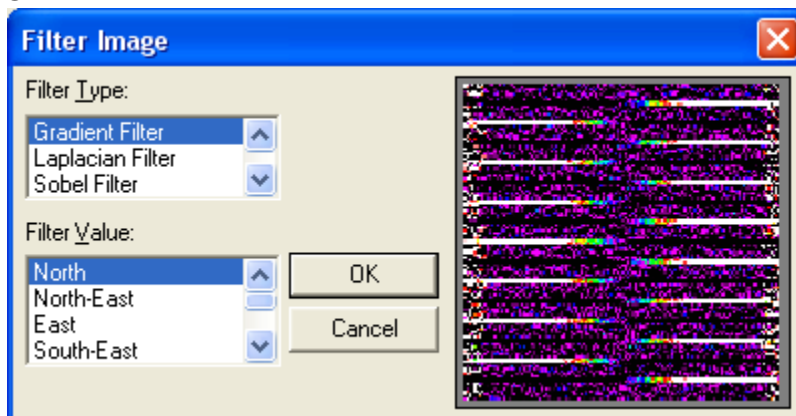
Figure 2-108 - Process Image Data - Standard Process Tab - Spatial Filter Subdialog.

2.4.9.1.4.2 Discussion

This Filter dialog allows selection of numerous spatial filter types. A preview of the selected filter is displayed in the window to the right.

2.4.9.1.5   Contour Filter subdialog

2.4.9.1.5.1 Dialog
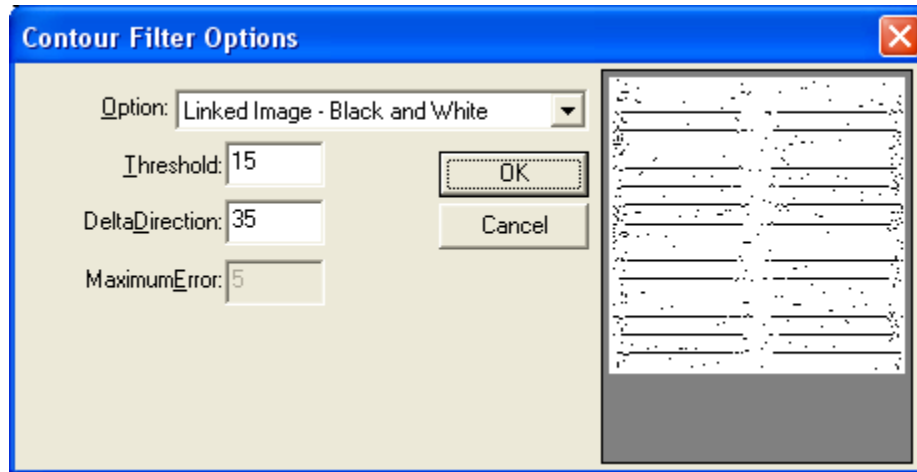
Figure 2-109 - Process Image Data - Standard Process Tab - Contour Filter Subdialog.

2.4.9.1.5.2 Discussion

Replaces the image with an image of contour lines derived from the original image. Contour curves (as an array of x,y data pairs) are not calculated.

2.4.9.1.6   Resizing subdialog

2.4.9.1.6.1 Dialog
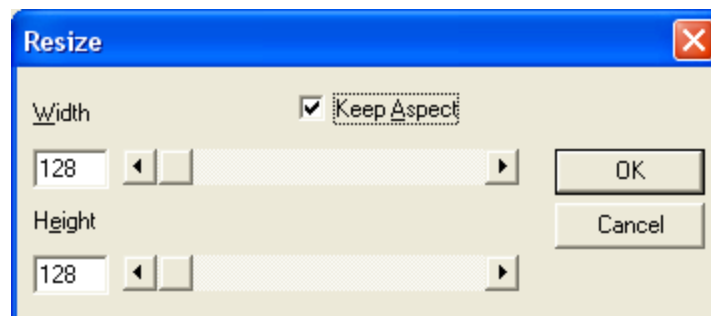
Figure 2-110 - Process Image Data - Standard Process Tab - Resizing Subdialog.

2.4.9.1.6.2 Discussion

Resizes the image to the specified width and height. If Keep Aspect is selected, whenever the width or height is changed the other control will be automatically adjusted to maintain the original image's aspect ratio.

2.4.9.1.7   Rotation subdialog

2.4.9.1.7.1 Dialog
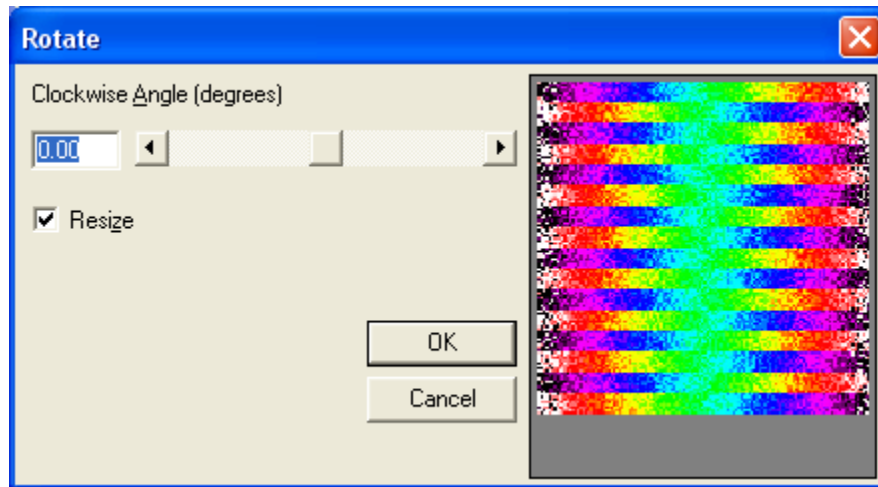
Figure 2-111 - Process Image Data - Standard Process Tab - Rotation Subdialog.

2.4.9.1.7.2 Discussion

Rotates the image by the specified angle. If Resize is selected, the image will be auto-matically resized to retain all data in the original image. If Resize is not selected, rotation of the image by any angle that is not a multiple of 90 degrees will result in data clipping.

2.4.9.2   Color Conversion

2.4.9.2.1   Dialog
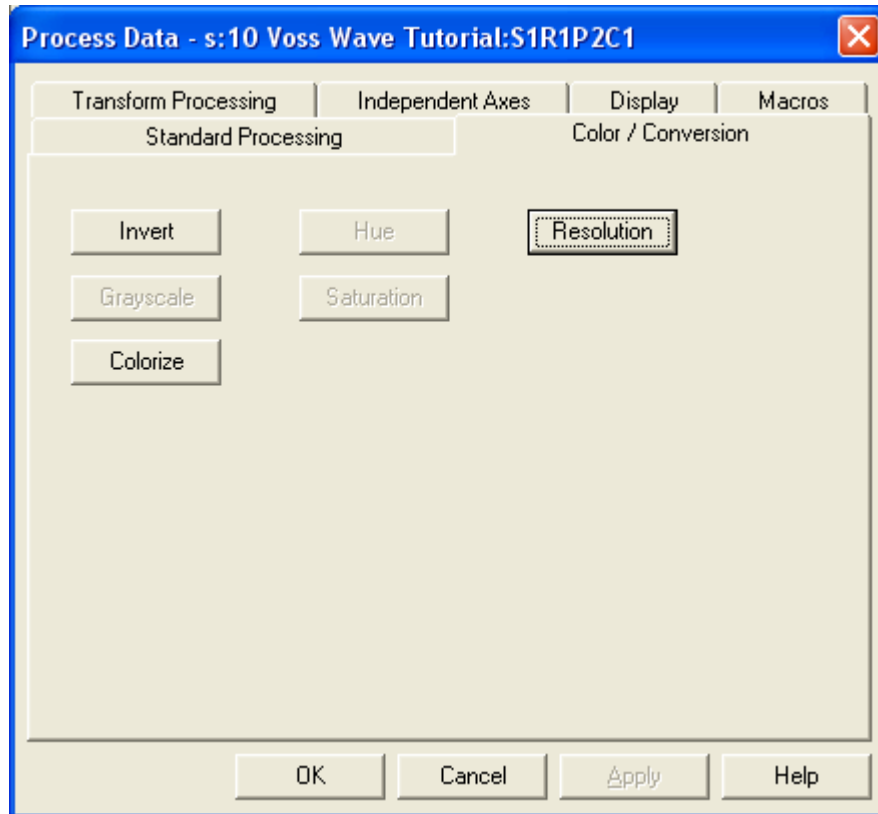
Figure 2-112 - Process Image Data - Color Conversion Tab.

2.4.9.2.2   Discussion

The color / conversion page is used to modify image colors, change image bit depth, and convert between grayscale and color images. Note that some operations on this page are only available when the image is grayscale, and others are only available when the image is color. Application of any operation on this page will delete the associated floating point data, if present.

2.4.9.2.3   Colorize subdialog

2.4.9.2.3.1 Dialog
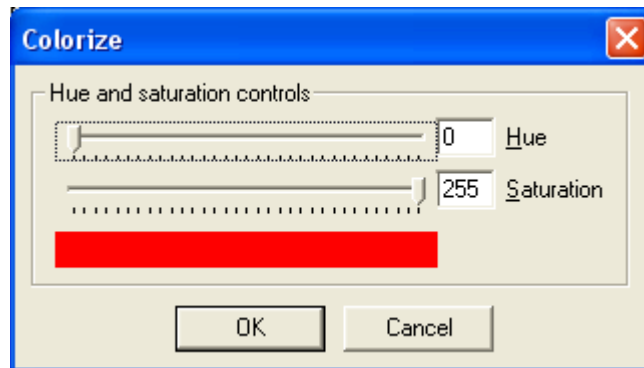
Figure 2-113 - Process Image Data - Color Conversion Tab - Colorize Subdialog.

2.4.9.2.3.2 Discussion

Creates a color image from a monochrome image, using the specified hue and saturation.

2.4.9.2.4   Hue, Saturation subdialog

2.4.9.2.4.1 Dialog
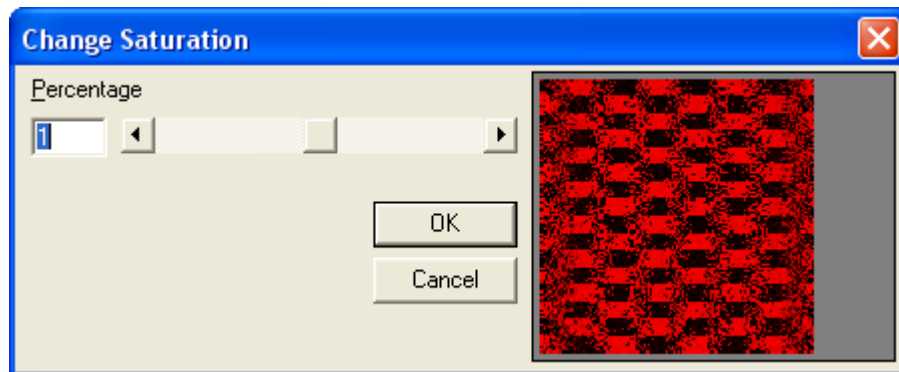
Figure 2-114 - Process Image Data - Color Conversion Tab - Saturation Subdialog.

2.4.9.2.4.2 Discussion

Changes the image's hue or saturation value. A preview image is shown on the right side of the dialog.

2.4.9.2.5   Resolution subdialog

2.4.9.2.5.1 Dialog
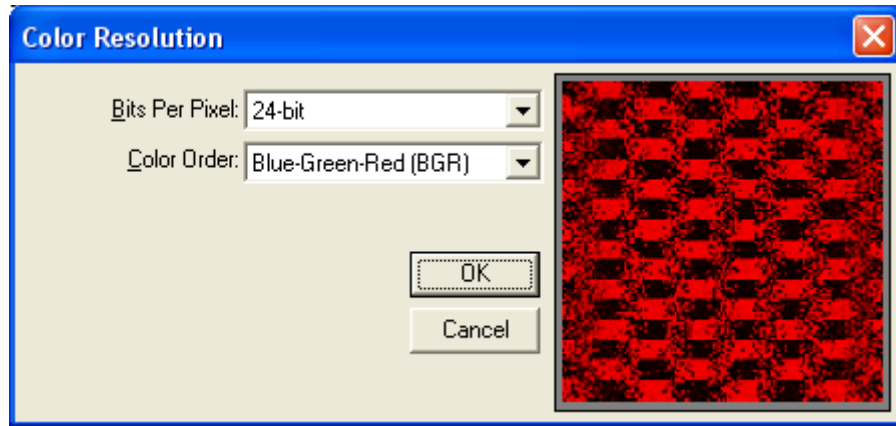
Figure 2-115 - Process Image Data - Color Conversion Tab - Resolution Subdialog.

2.4.9.2.5.2 Discussion

Changes the image's pixel resolution. Both color and grayscale options at various bit depths are available. A preview image is shown on the right side of the dialog.

2.4.9.3   Transform Processing

2.4.9.3.1   Dialog
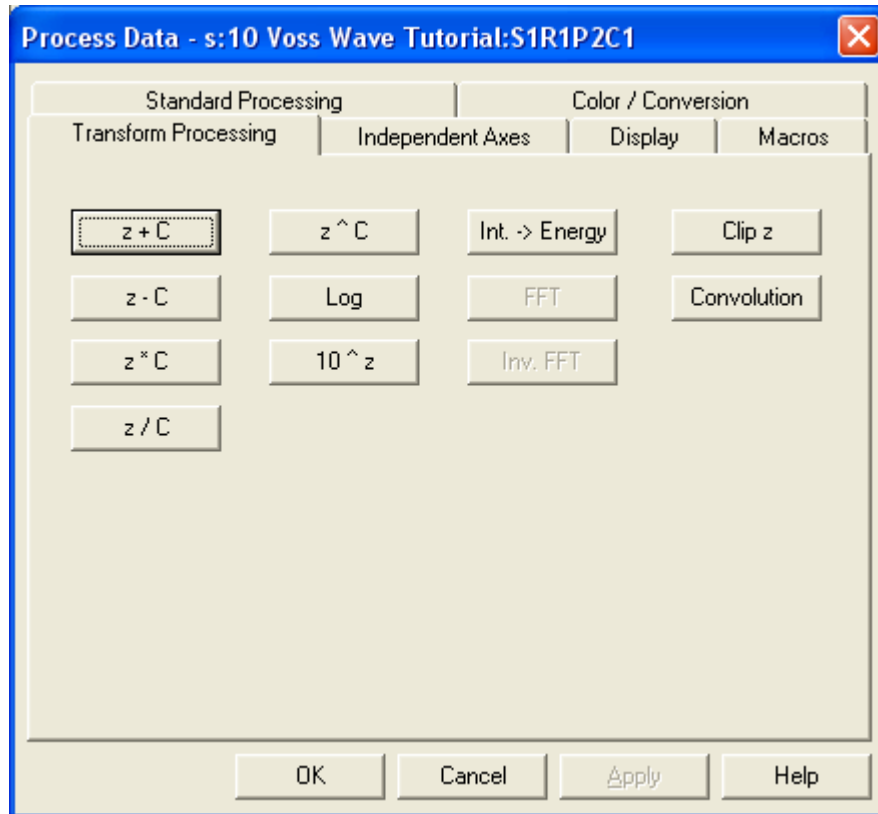
Figure 2-116 - Process Image Data - Transform Tab.

2.4.9.3.2   Discussion

The transform processing page is used to manipulate the image's underlying floating point data array. All operations on this page operate on the floating point z-axis data. If the image does not contain floating point data, an array of float data is created, using the pixel intensity at each location. Following any operation on the floating point z data, the corresponding bitmap is updated to reflect the change to the data. This representative bitmap uses 16-bit grayscale values.

2.4.9.3.3   Numeric Entry Subdialogs

Several buttons on the Transform Processing tab open the Numeric Entry subdialog shown in Section 2.4.8.1.3.

2.4.9.3.4　Clip z subdialog

2.4.9.3.4.1 Dialog
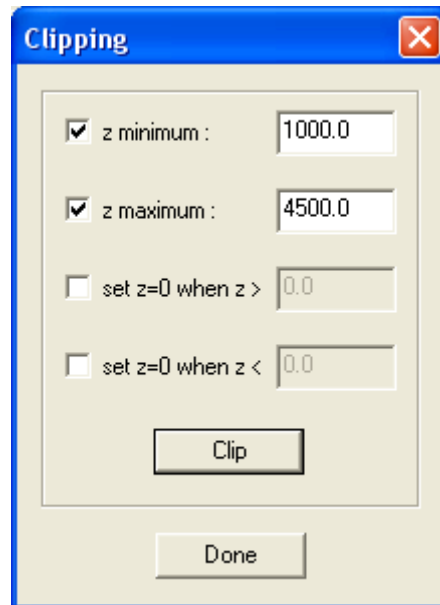
Figure 2-117 - Process Image Data - Transform Tab - Clip Z Subdialog.

2.4.9.3.4.2 Discussion

Image clipping limits or zeros the data values that fall outside the specified criteria.

Item	Description
z minimum	Set all pixels less than the specified minimum to that minimum value
z maximum	Set all pixels greater than the specified maximum to that maximum value
set z=0 when z>	Set all pixels greater than the specified threshold to 0
set z=0 when z<	Set all pixels less than the specified threshold to 0
Clip	Applies the selecting clipping operations. Does not dismiss the dialog, so multiple rounds of clipping can be applied.

2.4.9.3.5 Convolution subdialog

2.4.9.3.5.1 Dialog
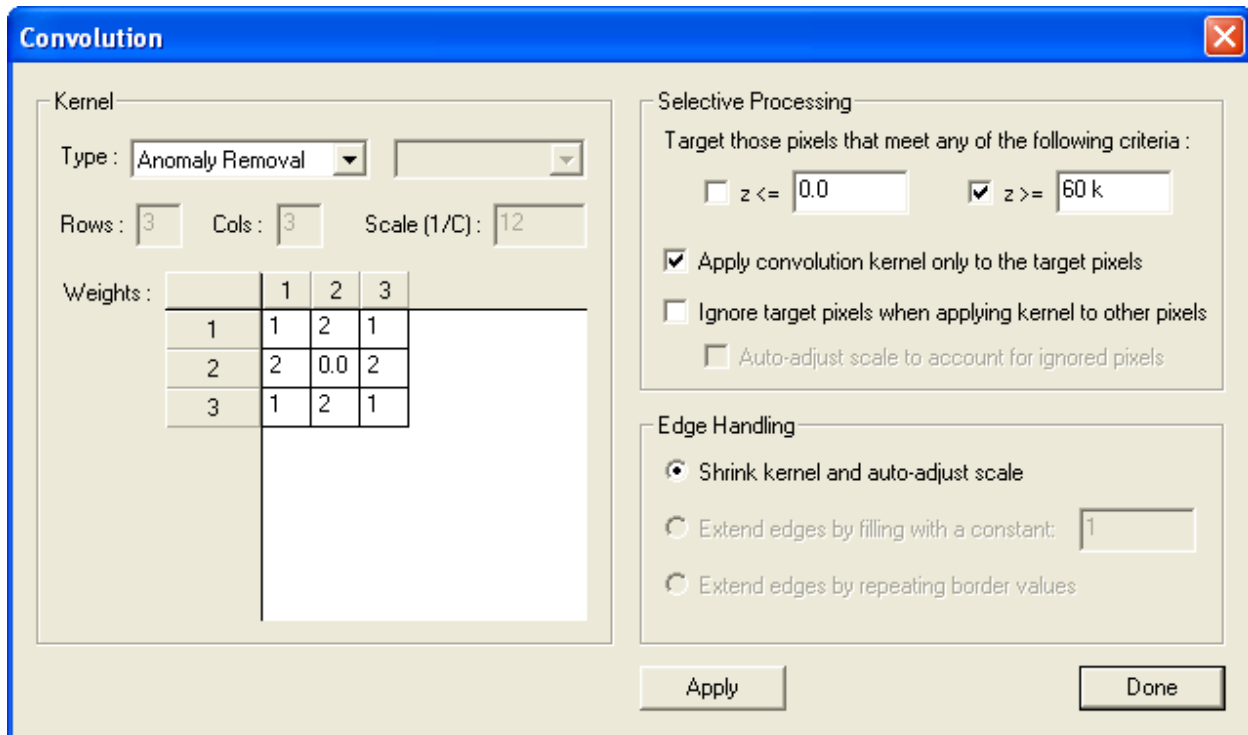
Figure 2-118 - Process Image Data - Transform Tab - Convolution Subdialog.

2.4.9.3.5.2 Discussion

The Convolution dialog is used to perform a two dimensional discrete convolution between the active image and the specified kernel. Kernel types are specified using the type lists and presently have fixed sizes of 3x3. Selective processing may be configured to either apply the kernel only to pixels with specified values, or to exclude pixels with specified values from the computation. Selective processing is commonly used with the Anomaly Removal kernel to remove bad pixels. Edge handling specification will be supported in a future release, but is presently fixed.

Many of these kernel convolutions are analogous to operations on the Standard Processing property page such as Spatial Filter, Sharpen, and Blur. While those operations manipulate the image only, kernel convolutions operate on the underlying floating point data.

2.4.9.4 Independent Axes

2.4.9.4.1 Dialog
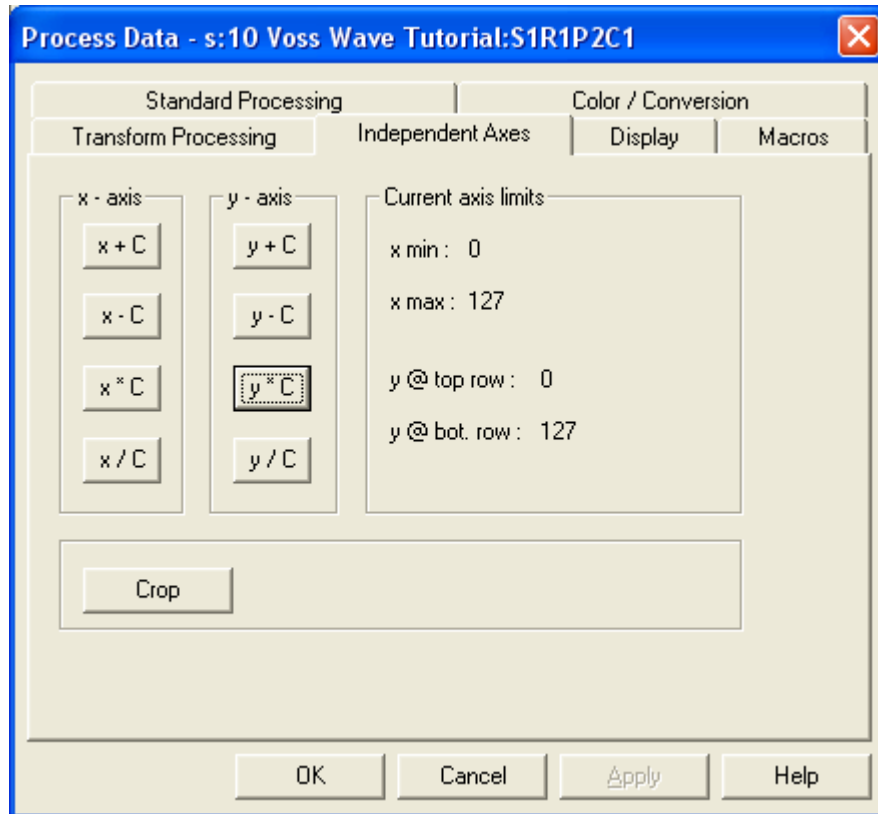
Figure 2-119 - Process Image Data - Independent Axes Tab.

2.4.9.4.2 Discussion

The independent axes page is used to scale and offset the real values for the x and y axes. Minimum and maximum axis values are displayed based on the current scale and offset values. Note that because bitmaps display the first pixel in the upper left corner of the image, the y maximum is often at the bottom row and the y minimum is often at the top row.

2.4.9.4.3   Cropping subdialog

2.4.9.4.3.1 Dialog
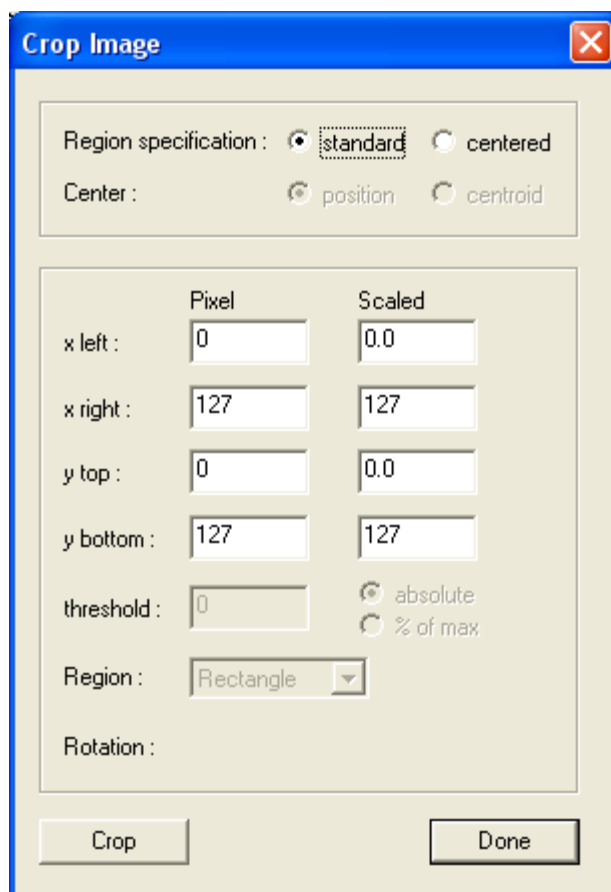
Figure 2-120 - Process Image Data - Independent Axes Tab - Cropping Subdialog.

2.4.9.4.3.2 Discussion

Crops the image based on the specified region. Regions can be defined using extents (left, right, top bottom) or using a center and size (height, width). The clipping center can be entered explicitly (x, y position), or the image's centroid can be used. If the centroid method is selected, a threshold value can be used to ignore low intensity noise during centroid calculation. Positions and sizes can be entered in pixel or scaled units. The clipping region can be either rectangular or ellipsoidal.

2.4.9.5   Display

2.4.9.5.1   Dialog
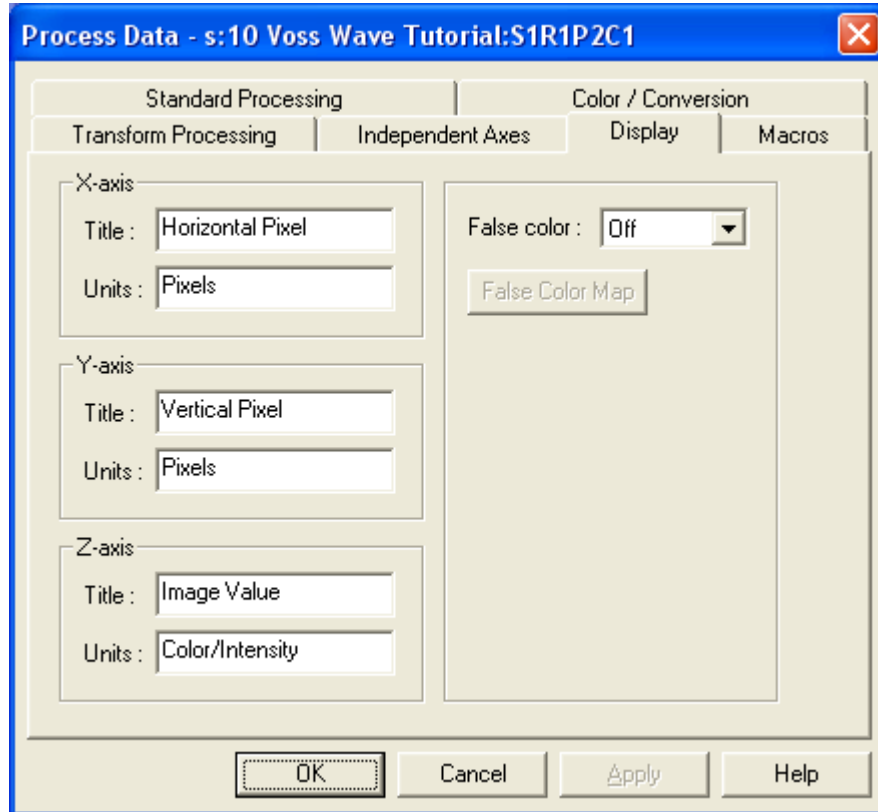
Figure 2-121 - Process Image Data - Display Tab.

2.4.9.5.2   Discussion

The image display page is used to change the image's axis labels and set the false color mode. False color mode can be set to off, automatic, or manual.

- Off uses the default (global) display mode for images.
- Automatic maps the entire z-axis data range to a color map that follows a standard color progression (black, magenta, blue, cyan, green, yellow, orange, red, white).
- Manual allows the user to specify the mapping between z values and color. At present, setting the axis labels is not supported as part of a macro operation. In addition, only manual false coloring is supported as part of a macro operation.

2.4.9.5.3 False Color Map subdialog

2.4.9.5.3.1 Dialog
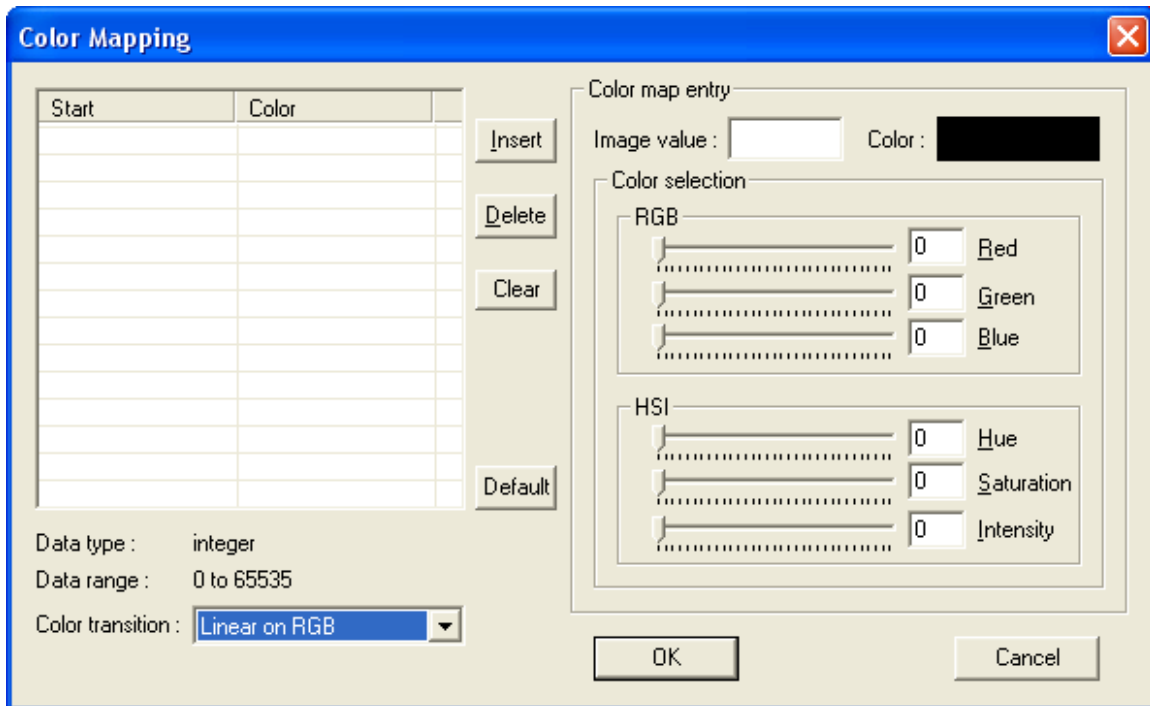
Figure 2-122 - Process Image Data - Display Tab - False Color Map Subdialog.

2.4.9.5.3.2 Discussion

2.4.9.6 Macro

2.4.9.6.1 Discussion

See the Waveform processing Macro discussion, Section 2.4.8.5.

2.4.9.7 How Accessed

Select any waveform data display, then…
- Analysis->Process…

-

- Right-click, then select Process… from the popup menu.

2.4.10 Combine Waveforms

2.4.10.1 Dialog
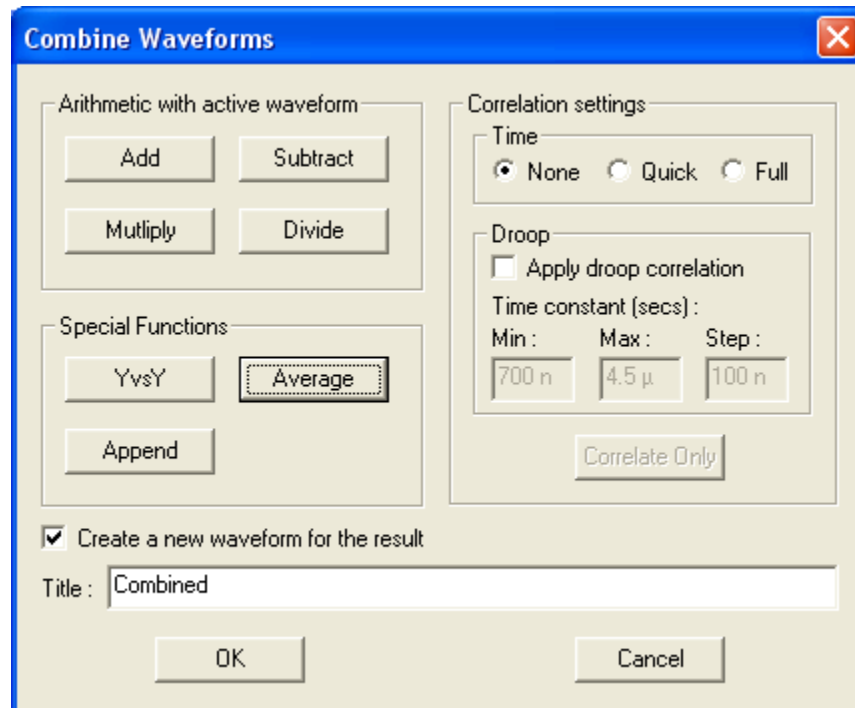
Figure 2-123 - Combining Waveforms.

2.4.10.2 Discussion

The Combine Waveforms dialog allows the application of basic math operations on waveform operands.

Waveform arithmetic: Supports addition, subtraction, multiplication and division of waveforms. The first operand is the active waveform, the second operand is selected by the user. The operation is computed in the domain of the first operand. The second waveform will be interpolated, if necessary, to match the domain of the first waveform. Any data outside the domain of the first waveform is ignored.

YvsY: Creates an output waveform using the y-axis data from the first waveform as the y-axis data, and making the x-axis data from the second waveforms y-axis data.

Average: Averages the active waveform with any other selected waveforms.

Create new waveform: Creates a new waveform window for the result of the operation. If selected, an edit control allows the user to specify the title for the new waveform. If not selected, the result replaces the data in the active window.

Correlation: Automatically correlates the active and selected waveform before applying the combine operation. The selected waveform is always correlated to the active window (i.e., the selected window is modified, the active window is not). Two types of correlation are supported:

Time correlation: Half-max matching finds the position of the first point which is 1/2 the absolute peak value, for each waveform. The algorithm then shifts the second operand waveform to time align the half-max points. FFT correlation uses the frequency domain correlation function to find the shift value that maximizes waveform correlation.

Droop correlation: Applies droop correction to the selected waveform to provide a better fit to the active waveform. A range of time constants to check must be specified. The time constant that provides the best fit is used to droop correct the selected waveform.

If both Time correlation and Droop correlation are selected, time correlation will be performed first.

Correlate Only: Performs time and/or droop correlation without any other processing.

2.4.10.3 How Accessed

Select a waveform plot, then:
- Analyzis->Combine…
-
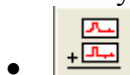
2.4.11   Combine Images

2.4.11.1 Dialog
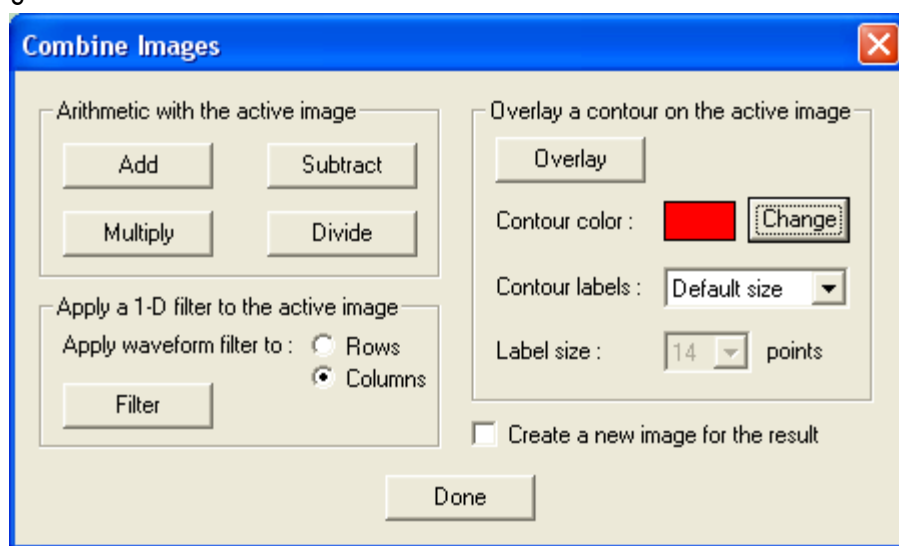
Figure 2-124 - Combining Images.

2.4.11.2 Discussion

The Combine Images dialog allows the application of basic math operations on image operands.

Image arithmetic: Supports addition, subtraction, multiplication and division of images. The first operand is the active image, the second operand is selected by the user. The operation is computed pixel by pixel over the dimensions of the first operand. Any data outside the dimensions of the first image is ignored.

1-D filter: Applies a 1-D (waveform) filter to each row or each column of the active image. The selected filter's domain should match the limits of the images x or y axis.

Overlay: Plots the selected contour plot on the active image.:

Contour color: Selects the color of the contour lines.

Font: Selects the font size for the contour labels.

Create new image: Creates a new image window for the result of the operation. If not selected, the result of the operation replaces the data in the active window.

2.4.11.3 How Accessed

Select an image plot, then:
- Analyzis->Combine…
-

2.4.12 Extract Waveforms

2.4.12.1 Dialog
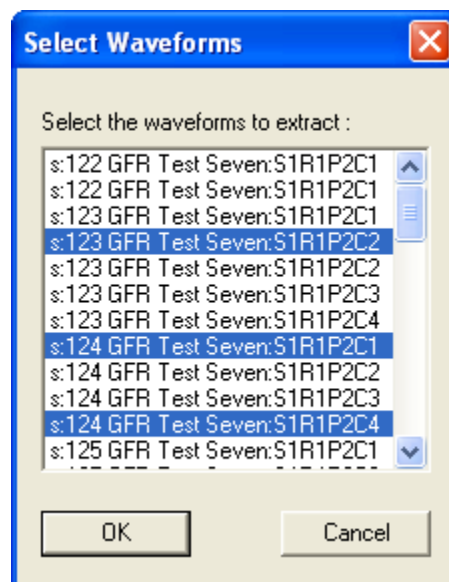
Figure 2-125 - Select Waveforms for Extraction from an Overlay.

2.4.12.2 Discussion

Extracts copies one or more waveforms from an overlay plot, creating a new waveform window for each extracted waveform. The overlay plot is not modified.

2.4.12.3 How Accessed

Select an overlay plot, then:
- Analyzis->Extract…
- Ctrl + F8

2.4.13 Macro List

2.4.13.1 Dialog
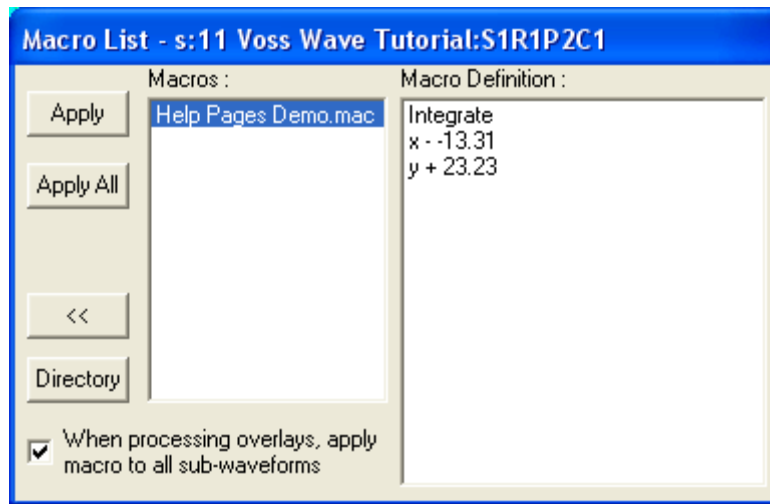
Figure 2-126 - Macro Quick-Access Dialog.

2.4.13.2 Discussion

This dialog provides quick access to macros that have already been created as described in 2.4.8.5. Selection of a macro from the list on the left displays the macro definition in the list on the right. The selected macro can be applied to the active waveform / image, or to all displayed waveforms / images. Application of a waveform macro to image data or of an image macro to waveform data will have no effect.

The Macro List dialog is modeless, meaning that, once activated, it remains visible in front of the Analyze window but allows operations in Analyze to be performed independently of the dialog window. Modeless activation allows a variety of macros to be applied to a changing selection of waveform and/or image plots. To close the dialog, simply reselect (uncheck) its menu option.

2.4.13.3 How Accessed

- Analysis->Macro List

2.4.14 Image Adjuster

2.4.14.1 Dialog
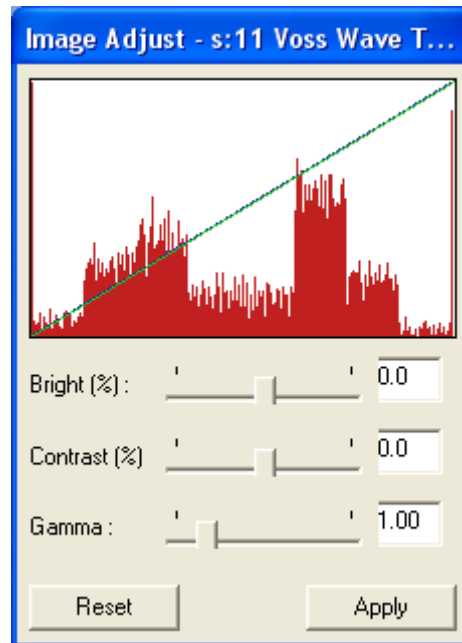
Figure 2-127 - Quick Image Adjustment Interface.

2.4.14.2 Discussion

This dialog presents a simple interface to quickly adjust fundamental display parameters of the image plot in the active window. The Image Adjust display window shows the active image's histogram and a curve that represents the current brightness, contrast and gamma settings for that image. Adjustments made in this interface are used to render the image, but do not affect the underlying data until the Apply button is pressed. Selecting Apply will apply the current settings to the image data (making them permanent), then reset the display settings to their default values (bright = 0%, contrast = 0%, gamma = 1.0).

This dialog is modeless, meaning that, once activated, it remains visible in front of the Analyze window but allows other operations in Analyze to be performed independently of the dialog window. Selecting a different image window will cause this dialogs interface to automatically update its display and settings. Adjustments can therefore be performed on a sequence of image plots simply by selecting each new image without having to close the dialog. To close the dialog, simply uncheck its menu option.

2.4.14.3 How Accessed

- Analysis->Image Adjuster

2.4.15 Acquisition Configuration

2.4.15.1 Dialog
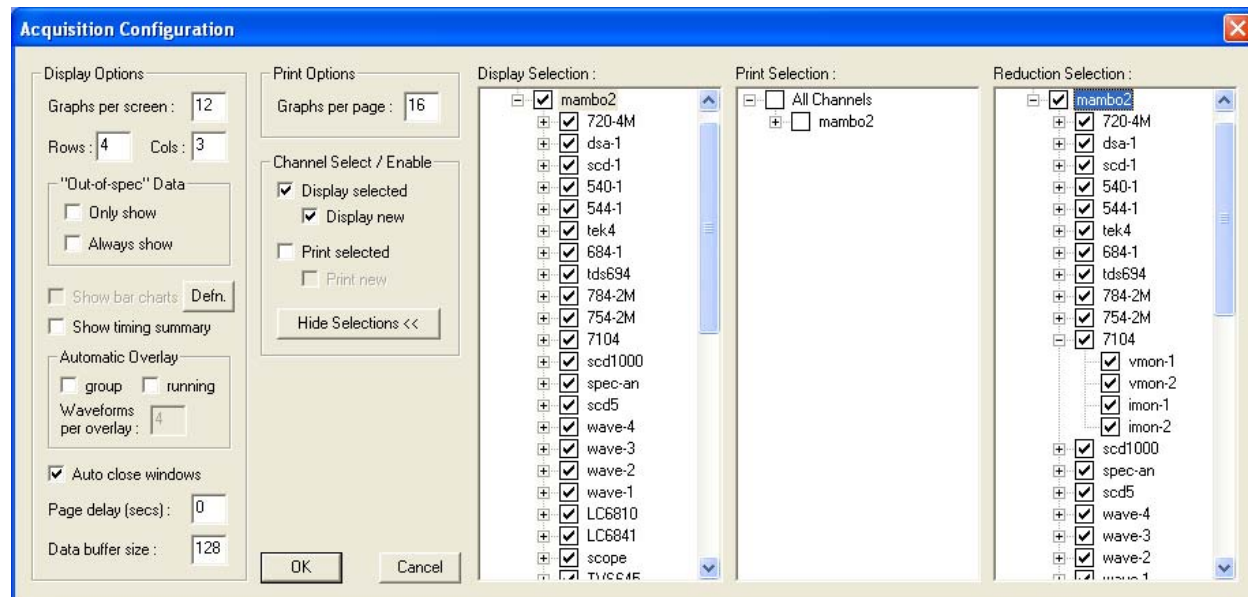
Figure 2-128 - Acquisition Configuration Dialog.

2.4.15.2 Discussion

The Acquisition Configuration dialog sets the display and print options for incoming acquired or reduced data. The Acquisition Configuration options determine only how Analyze manages acquired and reduced data transmitted from other modules or computers. Analyze does not control what data are transmitted or when data are transmitted.

2.4.15.3 Details

Item	Description
Graphs per screen	Sets the maximum number of graphs to display simultaneously. Changes to this value automatically updates the Rows and Cols fields.
Rows, Cols	Sets the number of Rows and Columns of waveforms to display on the screen. Changes to the Rows or Cols values automatically updates the Graphs per screen field.
Out-of-spec	Out-of-spec waveforms are reduced waveforms that are not within the minimum and maximum FOM (Figure of Merit) values that can be defined for each Cal Item in the signal paths specified in the CalMan module.
Out-of-spec, only show	Among the group of waveforms that are selected for display, show only those waveforms that are outside the tolerances established in CalMan.
Out-of-spec, always show	Always display waveforms that are outside the tolerances established in CalMan, regardless of the other display settings.
Show bar charts	Display defined bar charts following the acquired data. Select the Defn. button to specify the location of the bar chart definition file.
Show timing summary	Display a timing channel summary following the display of the acquired data.

Auto overlay	This option automatically displays multiple waveforms as a single overlay wave-form. Each overlay will contain data from multiple shots on a single channel. If auto-printing is enabled, the waveforms will also be printed as overlays. The waveforms are automatically stored in the database individually, not as overlays. The overlay waveforms can be saved to the database manually. Group – this auto-overlay option is used to overlay multiple shots with in a burst. For example, if a burst of 10 shots is acquired with 4 waveforms per overlay, 3 overlay waveforms will be created for each channel. The first two will contain 4 waveforms and the last overlay will contain 2 waveforms (4+4+2 = 10). This option is only available on systems that support burst mode acquisition. Running – this auto-overlay option is used to overlay waveforms over multiple shots in single shot or repetitive single shot mode. On each shot, the overlays will continue to append the new wave-forms. When the user specified number of waveforms per overlay, N, has been reached, the oldest waveform is removed before the new waveform is added. The overlay then displays the last N shots for a particular channel. Running overlays can be reset by selecting the Reset Overlays item in the Acquisition menu.
Graphs per overlay	Sets the number of waveforms to combine into a single overlay, if auto overlay mode is enabled.
Auto close win-dows	Automatically close all windows before displaying acquired and reduced data from an acquisition station.
Page delay	Sets the minimum amount of time to wait between filling the screen with graphs and clearing the screen for the next graph.
Data buffer size	Specifies the size of the buffer for displayed waveforms. Analyze stores this num-ber of waveforms internally, which allows paging through the buffer one screen at a time. When the buffer is full, new waveforms will replace the oldest waveforms in the buffer.
Graphs per page	Determines the number of graphs to print per page.
View selected channels	Enables the display of acquired data. If unchecked, no raw data will be displayed regardless of the other settings.
Display new chan-nels	Displays channels from instruments that have been recently added to DAAAC (in the Acquire module), but that have not yet been configured in Analyze.
Print selected channels	Enables printing of acquired data. If unchecked, no raw data will be printed, re-gardless of the other settings.
Print new channels	Prints channels from instruments that have been recently added to DAAAC (in the Acquire module), but that have not yet been configured in Analyze.
Display Selection	Selects the channels to be displayed.
Print Selection	Selects the channels to be printed.
Reduction Selec-tion	Toggles the display and print options for reduced waveforms of selected channels. Specification of which waveforms are displayed and printed is made per waveform in Cal Manager.

2.4.15.4 How Accessed

- Acquisition->Configuration…

-

2.4.16 Acquisition Setting Dialog

2.4.16.1 Discussion

This is a reduced read-only instance of the Acquire Module Global Settings dialog. The dialog is described in detail in Main Manual, Section 4.2.7. The presentation in Analyze allows the user to review the active configuration at the time a waveform or image was acquired.

2.4.16.2 Dialog Tabs

2.4.16.2.1 General Tab

2.4.16.2.1.1Dialog
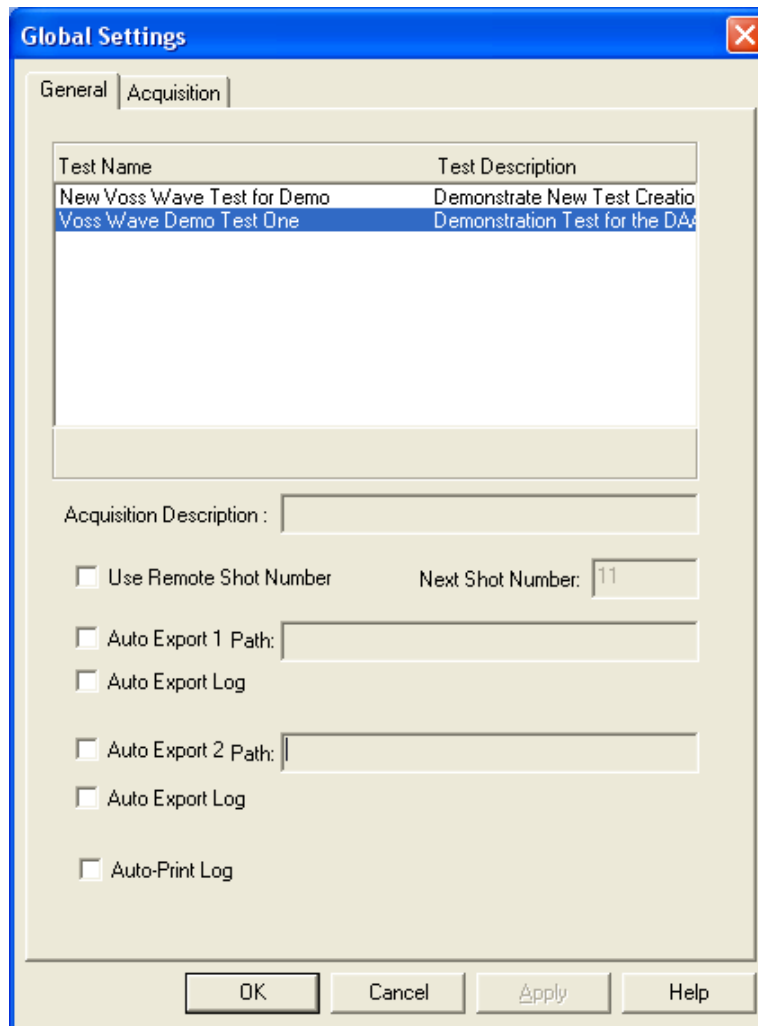
Figure 2-129 - Analyze Global Settings Review - General Tab.

2.4.16.2.1.2Discussion

See Main Manual, Section 4.2.7.1 for details about this dialog tab.

2.4.16.2.2   Acquisition Tab

2.4.16.2.2.1Dialog
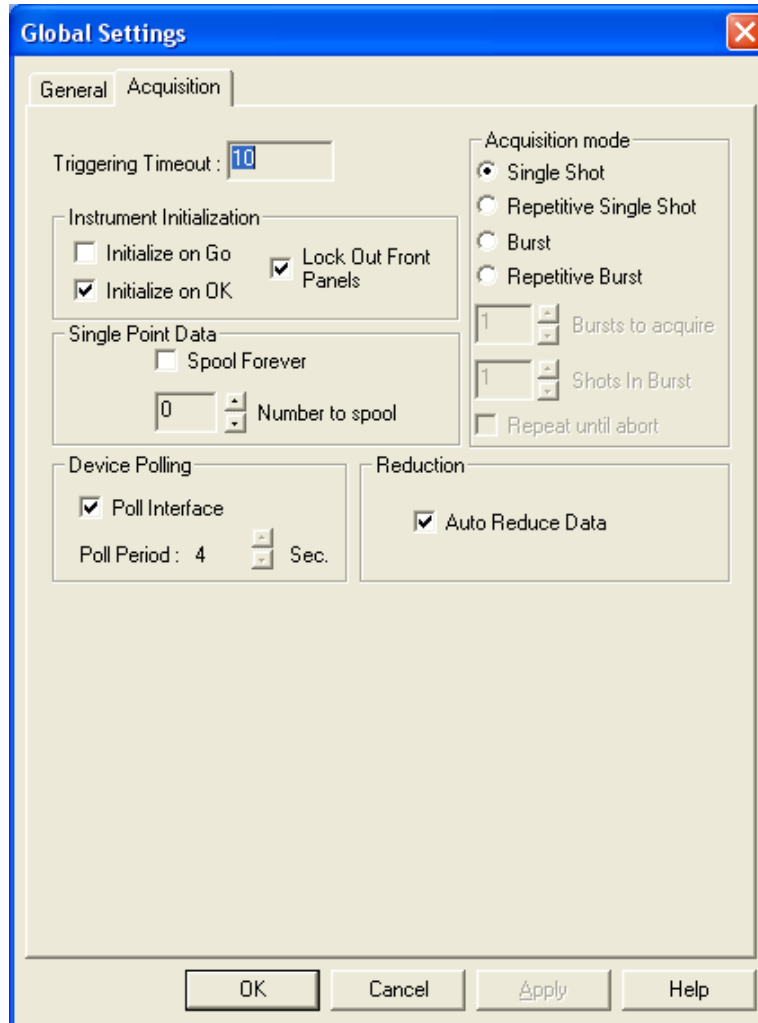
Figure 2-130 - Analyze Global Settings Review - Acquisition Tab.

2.4.16.2.2.2Discussion

See Main Manual, Section 4.2.7.2 for details about this dialog tab.

2.4.16.3   How Accessed

- Data View->Acquisition Settings

2.4.17 Info.txt Select dialog

2.4.17.1 Dialog
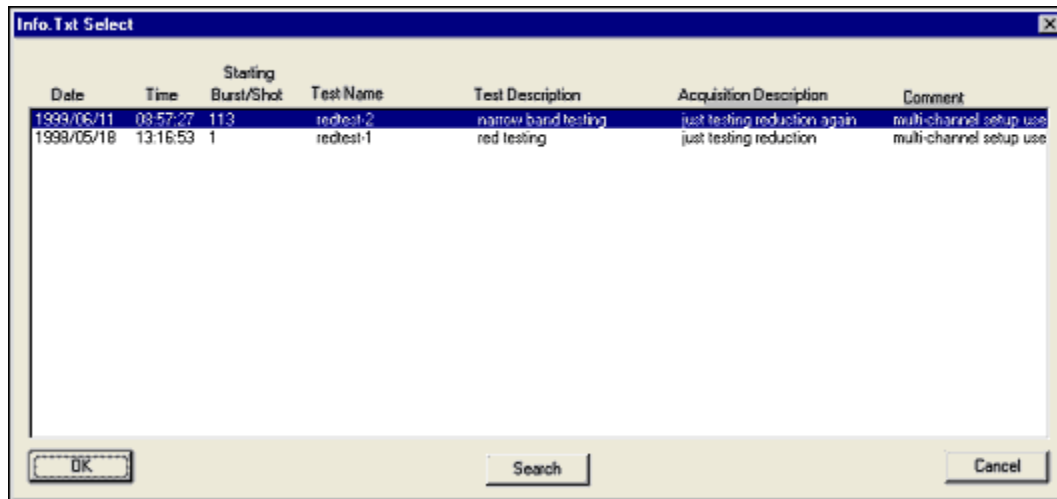
Figure 2-131 - Info.txt Selection

2.4.17.2 Discussion

The Info.txt Select dialog displays a consolidated history of Info.txt entries so that associated shot records can be compared quickly. Info.txt Search dialog searches for an entry.

To open Info.txt Select from Analyze:

1. Select **Data View**, then **Info.txt**. The View Current Info.txt window will appear.

2. Select **View Old Info.txt**. The Info.txt Select window will appear.

3. Select **Search**. The Search Info.txt Records window will appear.

2.4.17.3 Search subdialog

2.4.17.3.1 Dialog
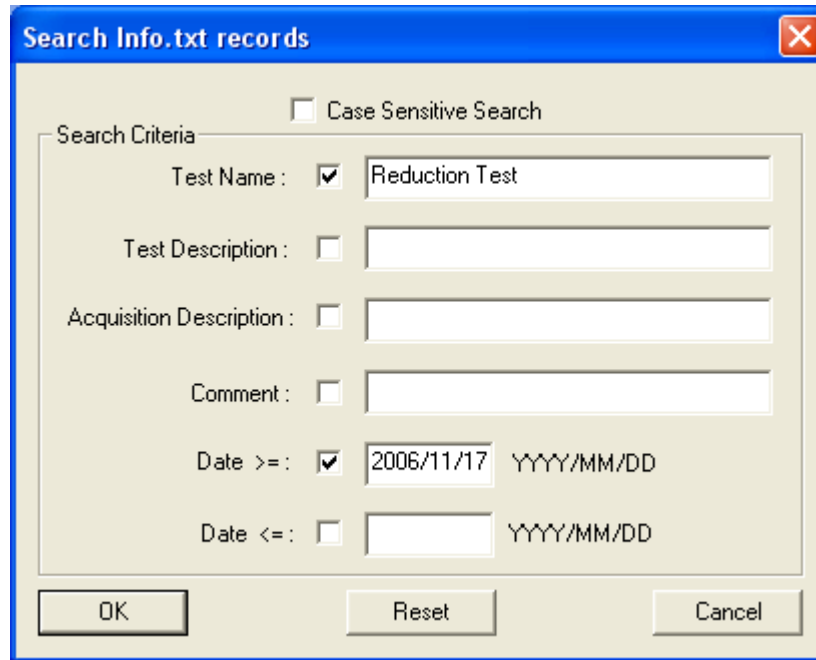
Figure 2-132 - Info.txt Database Search Configuration.

2.4.17.3.2 Discussion

Search Info.txt Records finds Info.txt records based on specific criteria, including date range, comments, or descriptions. Search Info.txt Records also can search for individual words or any portion of the Info.txt record. Search words or phrases may be case sensitive or not. To find a matching word or phrase, the characters or words entered in a search box must occur as a substring in the field of interest.

To search Info.txt entries from Analyze:

1. Select the Acquisition menu, then Info.txt. The View Current Info.txt dialog will appear.
2. Select View Old Info.txt. The Info.txt Select window will appear.
3. Select Search. The Search Info.txt Records window will appear.
4. Choose Case Sensitive Search if case sensitivity should be enforced.
5. Enter the search criteria into the appropriate areas.
6. Choose OK.

Info.txt entries can be edited only from Acquire.

2.4.17.3.3 How Accessed

- Data View->Info.txt, then click Search.

3 Appendix C – Figures of Merit (FOMs)

This section presents the available FOMs in two tables. The first table describes FOMs that are applied to waveforms. The second shows calculations for images. Both tables include columns for the FOM name, description and parameters. Parameters are exposed to the user in CalMan to allow the FOM calculation to be configured. In Acquire and Analyze, the parameters are fixed, as specified in the table. The Waveform table also includes a Waveform Type column. Although the FOM calculations may be applied to any type of waveform, they often have meaning only for specific waveform types. Those cases are specified here.

Note that the following terms are used interchangeably:

- X Value
- Horizontal Value
- Independent Value
- Time Value
- Position

Likewise for:

- Y Value
- Vertical Value
- Dependent Value

Table 3-1- DAAAC Figures of Merit (FOMs) for Waveforms

FOM	Description	Parameters	Waveform Type

avg pulse height	Find the average maximum positive pulse dependent value by averaging the maximum value from each of the pulses. Each pulse is bounded by the first point above the high threshold and the next point below the low threshold.	Fixed:
		  high threshold:
		    0.5 x Y max
		  low threshold:
		    0.1 x Y max
			Positive Pulse Train

baseline	The average of the specified % of the front of the waveform. This is used as a baseline to establish signal offset.	% Record Length:
		  Real - Percentage of the total number of waveform points used to do the average.
		Fixed:
		  % Record Length = 5.0
			Pulse or Pulse Train

base-top	Distance, in Y axis value, between the average of the first n points of the waveform that are within Min x Absolute Max of the baseline and the average of the first m points of absolute value greater than Max x Absolute Max. Here Absolute Max is either Y max or Y min, whichever is of greater magnitude.	Fixed
		  Min = 0.02
		  Max = 0.98
			Single Pulse

centroid	Given by $\sum_{(i=1..n)}(X_iY_i)/\sum(Y_i)$ where n is the number of points in the waveform.	None	All

decay slope	The slope of a linear fit of the points between Max % and Min % Y max as the waveform falls from Y max.	Fixed
		  Min = 30.0
		  Max = 90.0
			Positive Single Pulse

domain	The values over which the independent axis spans. Given as X max – X min.	None	All

fall time	The time it takes the signal to fall from stop threshold % peak to start threshold % peak. This is the time between the first transition of the low threshold after a transition of the high threshold and the high transition that immediately precedes the low transition.	start threshold (% peak):
		  The percentage of Y max and which to stop computing
		stop threshold (% peak):
		  The percentage of Y max and which to start computing
			Single Pulse

		Fixed:
		    Start threshold = 10.0
		    Stop threshold = 90.0	

integrated total	The last dependent value in the waveform. This represents the total integrated value of the inte-grated waveform	None	Waveform Integration
max/domain	Y max / domain (Y max defined below. domain defined above).	None	All

max pulse height	Detects the maximum Y value of the pulse with the highest peak value. For each pulse, the search starts when the signal rises above the high threshold. It stops at the next point detected below the low threshold.	Fixed:
		    high threshold:
		        0.5 x Y max
		    low threshold:
		        0.1 x Y max
			Positive Pulse Train

mean	The average Y value over the length of the waveform.	None	All

min pulse height	Detects the maximum Y value of the pulse with the lowest peak value. For each pulse, the search starts when the signal rises above the high threshold. It stops at the next point detected below the low threshold.	Fixed:
		    high threshold:
		        0.5 x Y max
		    low threshold:
		        0.1 x Y max
			Positive Pulse Train

off scale	Set in the acquire module if the raw data is off scale. This is not user-selectable.	None	Raw Wave-forms

peak avg.	The average of all dependent val-ues that lie between the first signal crossing from below to above the threshold and the last signal cross-ing from above to below the threshold. Threshold is expressed as a percentage of the peak.	Threshold:
		    Real – given in whole per-centage.
		Fixed
		    Threshold = 50.0
			Single Positive Pulse

peak-peak	The range between the minimum and maximum waveform depend-ent values.	None	All

pulse count	Count the positive peaks in a pulse train. A pulse is distinguish by signal that rises above the high threshold and then falls below the low threshold.	Fixed:
		    Low Threshold:
		        0.1 x Y max
		    High Threshold:
		        0.5 x Y max
			Bipolar Periodic or Positive Pulse Train.

pulse top	Compute the average of all Y data between two user-specified time values in X. Use of this FOM as-	Start time: Real – the X position of the left-most point in the	Single Pulse or Single

	sumes the user knows the times between which the pulse will occur. This FOM is not available in the Acquire or Analyze modules.	average. Stop time: Real – the X position of the right-most point in the average.	Pulse within a Pulse Train.

pulse width	Determines the duration of the pulse by first identifying the time of the waveform peak (Y max) value. The computation moves earlier in time from peak until it records the time at which the signal drops below the threshold. It then moves later in time from the peak until the signal drops below the threshold. The computed value is the later time minus the earlier time	Threshold:
		  Real – calculation starts and stops when the signal crosses this value.
		Pulse is pos:
		  Specifies that a positive pulse is to be measured.
		Pulse is neg:
		  Specifies that a negative pulse is to be measured.
			Single Pulse

rise intercept	The slope of a linear fit of the first series of points between 10% and 90% Y max as the waveform rises to Y max is computed. The resulting line is of the form $mX + b$. Setting $X = -b/m$ gives the X-axis intercept.	Fixed:
		  High threshold:
		    0.9 x Y Max
		  Low threshold:
		    0.1 x Y Max
			Positive Single Pulse or First Single Pulse in a Positive Pulse Train

rise slope	The slope of a linear fit of the first series of points between 10% and 90% Y max as the waveform rises to Y max.	Fixed:
		  High threshold:
		    0.9 x Y Max
		  Low threshold:
		    0.1 x Y Max
			Positive Single Pulse or First Single Pulse in a Positive Pulse Train

rise time	The time it takes the signal to change from low threshold % peak to high threshold % peak. Peak may be Y max or Y min. This FOM is the time between the first high threshold transition and the low threshold transition that immediately precedes the high threshold transition.	start threshold (% peak):
		  real – the magnitude of the low signal value at which the early time is recorded.
		stop threshold (% peak):
		  real – the magnitude of the high signal value at which the later time is recorded.
		Fixed:
		  start threshold = 10.0
		  stop threshold = 90.0
			Single Pulse

rms	Given by $((\sum_{(i\,=\,1..n)}(Y_i)^2)/n)^{1/2}$ where n is the number of points in	None	All

	the waveform.		
std dev.	The waveform standard deviation.	None	Single Pulse
sum	The sum of all Y values in the waveform	None	All
Total Area	Computes the numeric integral of the waveform.	None	All
X max	The maximum waveform independent value. Normally the horizontal position of the right-most point in the waveform. X_n for waveforms of length n. This may not be the case for scattered data. For entirely negative data, this computes the X value of the smallest magnitude.	None	All
X min	The minimum waveform independent value. Normally the horizontal position of the left-most point in the waveform. X_1. This may not be the case for scattered data. For entirely negative data, this computes the X value of the largest magnitude.	None	All
x @ y max	The horizontal position (independent value) at the first occurrence of the maximum dependent value.	None	All
x @ y	The interpolated position of the first (left-most) occurrence of the specified Y value in the waveform. The specified Y value may be a specific absolute value or may be a percentage of Y max. If the value is not found, the right-most X position will be returned. This FOM is not available in the Analyze or Acquire modules.	y value: Real – The absolute value of the point to look for or the percentage of the peak value at which to define the search value. Absolute: Look for the first occurrence of the specified y value. % of peak: Look for the first occurrence of: (y value / 100.0) * Y max	Single Positive Pulse
Y max	The maximum waveform dependent (vertical) value. For entirely negative data, this is the value with the smallest magnitude.	None	All
Y min	The minimum waveform depend-	None	All

	ent (vertical) value. For entirely negative data, this is the value with the largest magnitude.		
y @ x max	The dependent value at the position of the first occurrence of the maximum X value. (Typically the last point of the waveform.)	None	All
Y neg	The difference between the baseline and Y min. (Baseline defined above.)	None	Single Pulse
Y pos	The difference between Y max and the baseline. (Baseline defined above.)	None	Single Pulse

Table 3-2 - DAAAC Figures of Merit (FOMs) for Images

FOM	Description	Parameters
avg beam height	This FOM is not implemented.	threshold (% Peak): Real -
avg beam width	This FOM is not implemented.	threshold (% Peak): Real -
beam area	Count the total number of image pixels above the. If the X and Y axis data is scaled the FOM is also scaled by these values.	threshold (% Peak): Real – The value below which pixels are not considered part of the image whose area is being calculated. Fixed threshold = 50.0
beam height	Count the number of pixels in the image pixel column with the longest continuous group of pixels over the threshold. If the Y data is scaled the FOM is also scaled by these values.	threshold (% Peak): Real – The value below which pixels are not considered part of the image whose height is being calculated. Fixed threshold = 50.0
beam width	Count the number of pixels in the image pixel row with the longest continuous group of pixels over the threshold. If the X axis data is scaled the FOM is also scaled by these values.	threshold (% Peak): Real – The value below which pixels are not considered part of the image whose width is being calculated. Fixed threshold = 50.0
centroid x	The FOM reports the position of the horizontal center of intensity of the image. If the X axis data is scaled the FOM is also scaled. For data above the	threshold (% Peak): Real – The value below which pixels are not considered part of the image whose width is being

	threshold, the FOM is given by: $$(\sum_{(i\,=\,1..n)} Z_i \times X_i)/(\ (\sum_{(i\,=\,1..n)}\ Z_i)$$ Where *n* is the number of pixels over the threshold.	calculated. Fixed threshold = 50.0

centroid y	The FOM reports the position of the vertical center of intensity of the image. If the Y axis data is scaled the FOM is also scaled. For data above the threshold, the FOM is given by:
	
	$$(\sum_{(i\,=\,1..n)} Z_i \times Y_i)/(\ (\sum_{(i\,=\,1..n)}\ Z_i)$$
	
	Where *n* is the number of pixels over the threshold.
		threshold (% Peak):
		   Real – The value below which pixels are not considered part of the image whose width is being calculated.
		Fixed
		   threshold = 50.0

Strehl ratio		centroid threshold absolute % of max inner radius pixels scaled outer radius (0 = full image)
x @ z max	The X position of the first pixel in the image with the maximum value. The search is conducted from minimum to maximum Y position and from minimum to maximum X at each Y position.	None
y @ z max	The Y position of the first pixel in the image with the maximum value. The search is conducted from minimum to maximum Y position and from minimum to maximum X at each Y position.	None
Z max	The pixel value of the pixel with the highest value	None
Z mean	The summed value of all pixels divided by the number of pixels.	None
Z min	The pixel value of the pixel with the lowest value	None
Z std dev.	The standard deviation of all pixel values in the image.	None
Z total	The total of all pixel values in the image.	None

4 Appendix D – Remote Control Interfaces

4.1   Acquire RPC Interface

The networked DAAAC installations use remote procedure calls (RPC) to coordinate activities between the multiple Acquisition stations. This RPC interface is also exposed as an application programmer's interface (API) for remote control of the Acquire module by external applications.

4.1.1   API components

A C++ library provides direct access to Acquire's RPC interface. The following components are used by client applications to communicate with the Acquire module:

client class   `CremAcqClient`
include file   `RemAcqClient.h`
library   `NetAcquire.lib`

4.1.2   Functions

The CremAcqClient class includes the following methods (functions) to establish communications and control the Acquire module:

Open – opens the interface
Input:
    pszNetworkAddress – network IP address of the server (e.g. "242.168.1.17")
    pszProtocolSequence – communication protocol. Use "ncacn_ip_tcp"
    pszEndpoint – port that the server is listening on. Specified on the DAAAC computer in the
        registry item HKLM\Software\VSI\DAAAC\NetAcqPort

Close – closes the interface

IsOpen – returns TRUE if the interface is open and the server is available.

GetLastErrorText – returns the text of the last error

Arm – Initializes and arms the DAAAC instruments in preparation for an acquisition event.
Input:
    burst – the burst or shot number to use for the next acquisition event. If set to 0, DAAAC
        will increment its internal burst / shot number.
    shotsinburst – the number of shots in the burst. if 0, the system will run in single shot mode.

ForceTrig – Issues a soft trigger command to force all armed instruments to trigger. Has no effect if called when the DAAAC system is not in an armed state.

Abort – Aborts the current acquisition sequence and returns all instruments to their initialized state. Has no effect if called when the DAAAC system is not in an acquisition sequence.

Poll – retrieves DAAAC's current acquisition state.
Output:
   eState – enum that specifies the current acquisition state
   strState – string that decribes the current acquisition state
   eReason – enum that specifies the reason for the transition into the current state

Arm, ForceTrig, Abort, and Poll return an enum that specifies the return status of the called function. All enums are defined in RemAcqClient.h

4.2   Acquire TCP Socket Interface

A transmission control protocol (TCP) socket interface is available for acquisition sequence coordination between an external application and the DAAAC Acquire module. Unlike the RPC interface (Section 4.1), this is a custom interface that does not provide general purpose acquisition control.

4.2.1   Adapter

This interface uses an adapter application (Figure 4-1) that listens for commands from a client application via a TCP socket interface and transmits those commands to the Acquire module using the Acquire's native RPC interface.
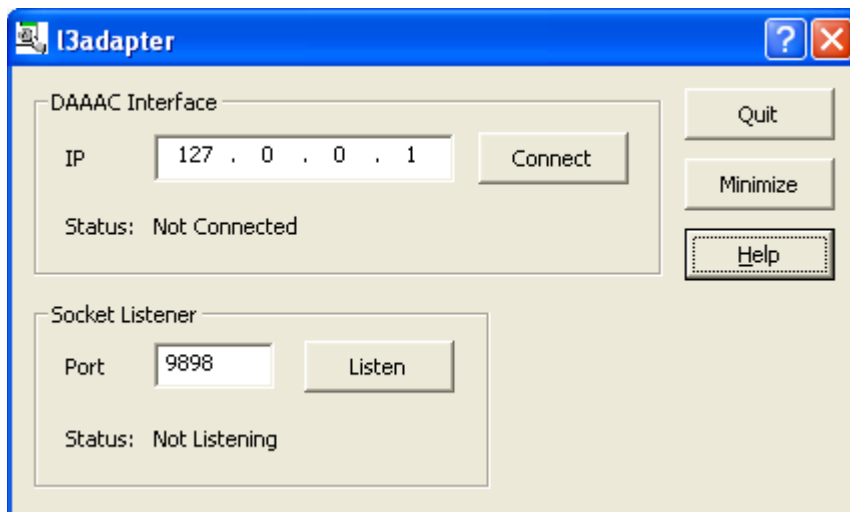
Figure 4-1. Adapter application for TCP Sockets to DAAAC RPC conversion.

To enable communication between a socket client application and DAAAC, do the following:

1. Start the DAAAC Acquire and CalMan modules if necessary;
2. Run the adapter application, l3adapter.exe, on the client application computer;
3. Enter the IP address of the DAAAC computer and select Connect (can use address 127.0.0.1 if DAAAC and the client application are running on the same machine);
4. Enter the socket port number used by the client application and select Listen.

4.2.2 Commands

The following commands are supported from the TCP socket client:

Command	Response	Description
Ready?	*Ready!*	DAAAC is in a state where it can be armed
	Not_Ready!	DAAAC is not in a state where it can be armed
TrigTest_<shot #>	*TrigTest_<shot #>*	DAAAC successfully selected the trigger test configuration and set the shot number to <shot #>
	Duplicate_Filename	The specified shot number already exists in the database
Shot_<shot #>	*Shot_<shot #>*	DAAAC successfully selected the shot configuration and set the shot number to <shot #>
	Duplicate_Filename	The specified shot number already exists in the database
Timing_Data?	*TrigTest_<shot #> _Timing_< trig time list>*	DAAAC transmits a list of comma separated trigger times (in nanoseconds) for the channels specified in the Acquire module Trigger Time Channels dialog (see Section 2.1.18). Times are listed in the same channel order shown in the Trigger Time Channels dialog.
	Shot_<shot #> _Timing_< trig time list>	Timing data response when using a shot configuration.
	N/A	Trigger time data is not available yet.
Test_Complete	*Test_Complete*	Informational only – alerts DAAAC that it may begin processing the acquired data.

In addition, DAAAC will transmit the message *I_am_up* every second while its socket interface is active. DAAAC will reply *What?* to any unknown command, or if the command cannot be immediately processed. For example, the *Timing_Data?* command reply will be *What?* if the command is issued while DAAAC is running an acquisition / reduction sequence.

5 Appendix E – Cal Items

This appendix presents a formatted description of every available item in the CalMan inventory. The format is as follows:

- Section E.*x* – Cal Item Name
- Section E.*x*.1 – Category –
    - o Waveform Reduction – used to process waveform data
    - o Image Reduction – used to process image data
    - o No Reduction – used for documentation purposes only
  And type
    - o Hard – represents a hardware item in the signal path
    - o Soft – represents a software processing operation
- Section E.*x*.2 – Discussion. Complete description of the Item
- Section E.*x*.3 – Item Data
- Section E.*x*.3.1 – Dialog Image
- Section E.*x*.3.2 – Dialog Discussion. Descriptive verbiage regarding the dialog
- Section E.*x*.3.3 – Dialog Details. Tabular description of every dialog control, by name.
- Section E.*x*.3.4 – Subdialogs. Image, discussion and details of subdialogs accessed from the Item dialog, if any.
- Section E.*x*.4 – Cal Item Icon.

Note that Section E.1 groups the most common Cal Items, with similar or identical interface, into a single entry. The remaining E.x sections refer to special cases of Cal Items.

All Cal Items have an associated reduction dialog. The dialogs basic form is shown in Figure 5-1. The dialog and its various subdialogs are discussed in detail in 2.3.17. Some Item Reduction dialogs include an additional check box labeled Process a copy of the input waveform. When this option is checked, the reduction is done on the input data, but the data is passed along unaltered to the next item in the Cal Line. When the box is unchecked, the reduction will be applied to the data that is passed to the next item.

Figure 5-1 - Basic Reduction Dialog Tab

5.1 Standard Cal Items

5.1.1 Category

Wfm Reduction – Hard Item.

5.1.2 Discussion

This section describes the CalMan functional interface for a group of Cal Items that have identical or nearly identical configurations. The group includes:

- Amplifier – an instrument that linearly scales the level of an input signal. Normally the signal is increased by the gain of the amplifier.
- Attenuator – could be thought of as an amplifier with fractional gain. This device reduces the level of the input signal by linearly dividing it by the attenuation factor.
- Balun – a device to join a balanced electrical load to an unbalanced load.
- Cable – A cable is a device to transmit a signal from one place to another. Ideally the cable has no effect on the signal. However, a physical cable introduces impedance and capacitance that are applied linearly to the signal as a function of cable length.
- Coupler – A device for combining two or more signals.
- Crystal – a crystal is used to generate a signal at a particular frequency.
- Filter – any of a wide variety of instruments that alter the input signal in some defined way. Most often a filter is used to restrict the frequency content of a signal.
- Free Space - this "instrument" introduces the electrical properties of a vacuum or atmosphere over a distance.
- Integrator – An op-amp circuit whose output is the integration of the input signal over the duration of the signal.

5.1.3 Item Data

5.1.3.1 Dialogs
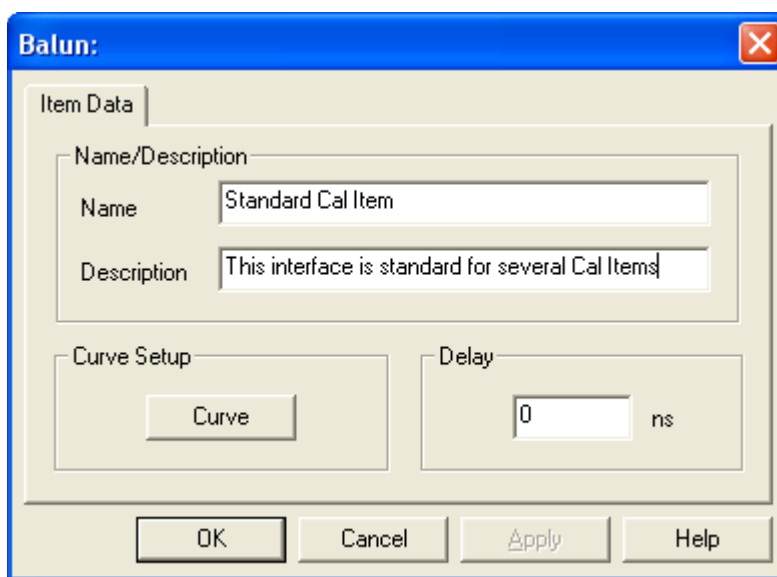
Figure 5-2 - Balun Cal Item uses the Standard Dialog.

5.1.3.2 Discussion

Most Hard Cal Items are derived from the standard form of Figure 5-2. This includes a unique item name and descriptive text. A Curve button opens the dialog of 5.1.3.3.1. It is used to specify the curve that characterizes the effects of the item on the input signal. A Delay field is used to specify the signal propagation time through the item in nanoseconds. During reduction, the delay value is subtracted from the time domain signal's x-axis values. Many items modify this standard interface by removing the Curve or Delay field and/or adding additional fields as specified immediately below.

5.1.3.3 Details

Item	Description
Name	This field requires a unique name, and duplicates are not allowed. For relaxed inventoried systems, only; this does not appear in strict inventoried systems.
Description	Optional description for this Cal Item.
Curve	Opens the subdialog of 5.1.3.3.1. The dialog defines the curve that characterizes the input signal response to the device.
Delay ns	Signal propagation delay through the item.

5.1.3.3.1 Dialog Variations by Cal Item

This table presents controls, by cal item, that differ from the standard dialog shown in Figure 5-2.

Cal Item	Item	Description
Amplifier	Pulse Cal Date	The date the last Pulse Calibration was performed on the item. This item is informational for the purpose of documentation. It does not affect the function of the Cal Item at reduction.

	Std Dev	Standard deviation from the last pulse calibration. This value is not used during data reduction.
	Pulse Cal.	Calibration factor from the last pulse calibration. This value is not used during data reduction.
Attenuator	Inline	The attenuator type is Inline. An inline attenuator has a single input. Number of positions is preset to 1 and cannot be changed. Also, the curve's Current Position is always set to 1.
	Rotary	The attenuator type is rotary. A rotary attenuator differs from the inline type because it can have more than one input port. This number is defined by the entry in the Number of Positions field.
	Number of positions	The number of input ports for rotary type (multiple input) attenuators. Characterization curves should be specified for each position.
	Current position	The current input port to the rotary type. This number determines which input is currently used during data reduction. This number corresponds to a curve that is assigned to the attenuator's port. The inline type's current position is always 1.
	Edit Curve	Activates the Curve dialog for assigning a reduction value (dB) or an actual characterization waveform. If the type is rotary then one curve is available for each position. The curve that is viewed/edited is determined by the entry in Setup position.
	Setup position	For rotary attenuators only, the current entry determines which curve will be viewed/edited when Edit Curve is selected.
Cable	Cable type	The cable type helps determine how reduction is performed for this item. The velocity of propagation is known for each type, and the delay is automatically calculated according to the length of the cable, as entered in the Length field. The cable type selected should match the actual cable type in use. The choices include: CE Precision, RG58, RG174, RG214, RG230, RG223, Superflex ½, Superflex ¼, and Other. If type Other is selected, the delay is not computed from the length, but can be entered manually.
	Connector A/B	Cable-end connector types. Informational - not used in data reduction.
	Length	The actual length of the real cable in feet. The length field is used in conjunction with the Cable Type field to compute the delay.
	Gain Curve	Activates the Curve dialog so that a characterization waveform may be assigned to this item for reduction.
	TDR Curve	Activates the Curve dialog so that a characterization waveform may be assigned to this item, but the curve is not used in reduction.
Crystal	Frequency Setting	The frequency, in gigahertz, for the current Curve. This can contain a list of many different frequencies, each having a unique reduction curve. The frequency is entered into the list when you tab out of the Frequency edit field. To delete a frequency from the list, simply blank out the number, then tab out of the field.
	Polarity	The crystal polarity. During reduction, any portion of the signal that is the opposite polarity of the setting will be set to zero.
Filter	Filter Type	Informational - not used during data reduction.
Free Space	Distance	The free space distance between radiating and receiving components (antennas).
	Units	The units of the free space distance. Inches, feet, millimeters or meters.

Integrator	Type	Allows selection of Active or Passive integrators.
	Time constant	Specifies the integration time constant in microseconds.
	Gain	Activates the Curve dialog for viewing / editing the characterization waveform.
	Impedance	Not presently supported
Multi Port	Number of Ports	Number of ports on the multi-port (input or output) side of the item
	Curve Setup (port)	Determines which port's characterization curve will be viewed / edited when Curve is selected.
Probe	Probe Type	Available probes are Voltage Monitor, Current Monitor, and Arbitrary (any other).
	Input units	Volts, amps or other.
	Conversion factor	Scalar factor to convert probe output to probe input.
	Integrate Signal	If a differential probe, checking this box will integrate the signal before processing.
Time Shift	Time shift	While most items have a delay value that is subtracted from the x-axis values during the reduction process, the time shift value is added to the x-axis values. The time shift value may be positive or negative.

5.1.3.4   Subdialogs

5.1.3.4.1   Curve – Polynomial

5.1.3.4.1.1 Dialog
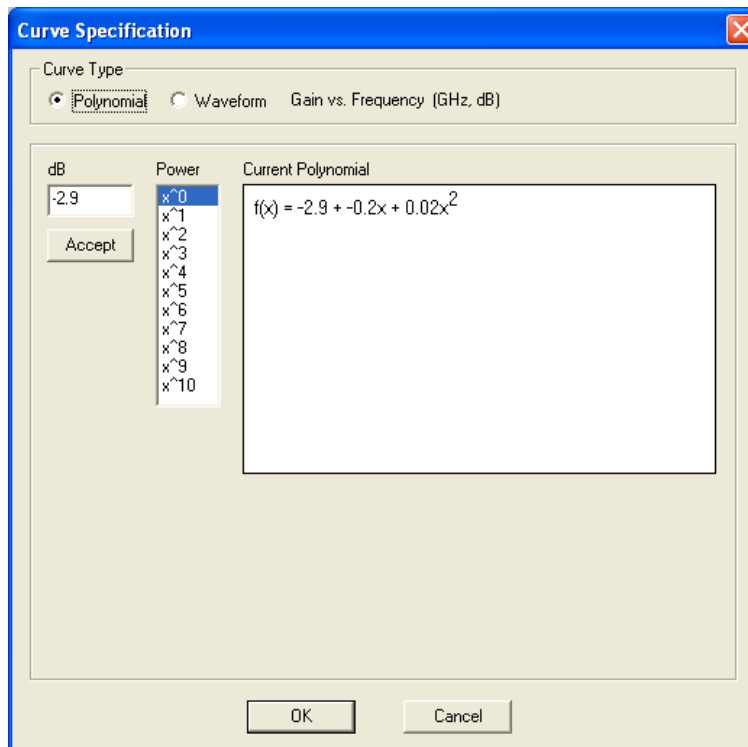
Figure 5-3 - Polynomial Characterization Curve Definition

5.1.3.4.1.2 Discussion

A detailed discussion is presented in Main Manual, Section 6.2.5.2.3.2.

5.1.3.4.1.3 Details

Item	Description
Polynomial	When selected, activates the Polynomial curve reduction fields. The defined polynomial then is used to characterize the Cal Item during reduction.
dB	The polynomial can be a constant value (power == x^0), or up to a tenth-order polynomial. To create the polynomial, enter a coefficient value in the dB field. Next, select the associated Power (x^0 .. x^10). Finally, select Accept to add the specified monomial to the total polynomial. The Current Polynomial box displays the complete polynomial. An existing term's coefficient may be modified by selecting the desired Power value, entering a new dB value, then selecting Accept.
Power	Current polynomial power.
Current Polynomial	The configured polynomial. The polynomial will be displayed from lowest to highest power (f(x) = a + bx + cx^2 + dx^3 +…), regardless of the order of entry.
Accept	Enters the monomial specified by the current dB and Power values into the polynomial.

5.1.3.4.2   Curve – Waveform

5.1.3.4.2.1 Dialog
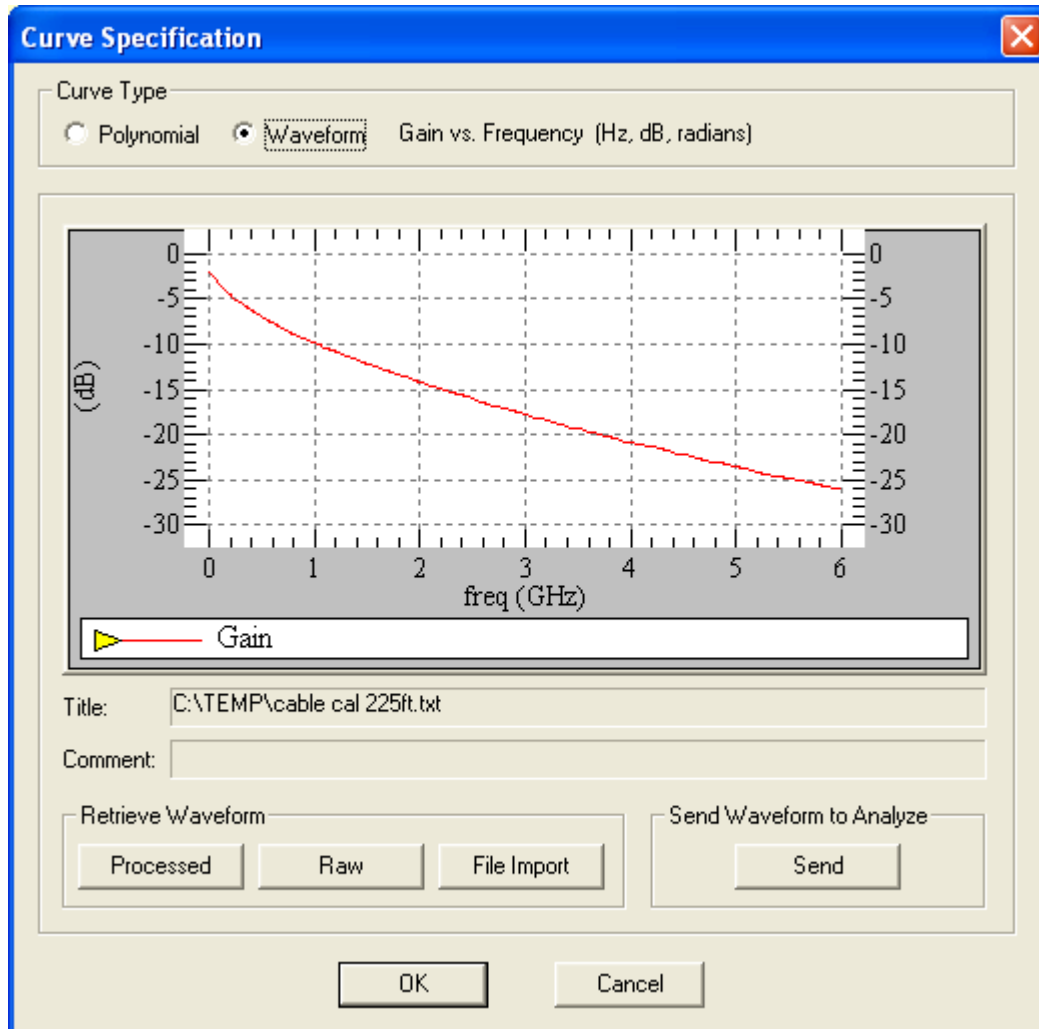
Figure 5-4 - Waveform Characterization Curve Definition

5.1.3.4.2.2 Discussion

A detailed discussion is presented in Main Manual, Section 6.2.5.2.3.2.

5.1.3.4.2.3 Details

Item	Description
Waveform	When selected, activates the Waveform curve reduction fields. The selected waveform is then used to characterize the Cal Item during data reduction. When a waveform is selected (Raw, Processed, or Get File), the waveform selected is displayed.
Processed	Select a Raw waveform from the database.
Raw	Select a Processed waveform from the database.
File Import	Select a waveform from the disk.
Send	Open the waveform in the Analyze module.

5.1.4 Icon

5.2 A Note on Rotary Attenuators

While attenuators are grouped under the standard Cal Items, above, a subcategory of attenuators, known as rotary attenuators, deserves some additional discussion. A rotary attenuator is an attenuator that has multiple, dynamically selectable attenuation values. The item is a variant of the standard attenuator and is added to the graph like any other standard component. The attenuator type (rotary or inline) and number of rotary positions must be specified when the item is created, and cannot be changed after the item is created.

Each attenuation position has a corresponding characterization curve. The rotary attenuator's current position (attenuation setting) can be manually selected from the Cal Item's dialog, or it can access an external file that specifies the current position and its corresponding curve.

The Reduction page for the rotary attenuator contains a field for a file name, if the current port is specified via file. Enter the full path and file name or, alternatively, choose Get File, navigate to where the file resides, then select the file.

This file is used during reduction to retrieve the current Curve position for the attenuator. CalMan searches the file for the attenuator's name and the corresponding integer index. The name in the file must exactly match the name used on the attenuator's Item Data page.

5.2.1 Rotary Attenuator File Format

The Rotary Attenuator file may contain a descriptive header, but this first-line entry is not required. The file may contain any number of attenuator names and corresponding integer position indices. The name must be listed first, followed by a comma and the integer that indicates the Curve position to use.

The Curve position number must be between one and the maximum number (inclusive) of attenuator positions. This number was defined when the attenuator was created. The name in the file must be the attenuator's name as it is entered in the attenuator's Item Data page.

The following is a sample file:

```
ROTARY ATTENUATOR NAMES
Atten1, 1
Atten2, 2
Atten3, 5
Atten4, 1
```

The number following the comma may be preceded by any amount of white space. The file also can be constructed as follows:

```
ROTARY ATTENUATOR NAMES
Long Attenuator Name,           3
Another Long Attenuator Name,   1
Short Name,                     1
A1,                             2
```

5.3   Multi-Port Cal Items

Multi-Port Cal Items are items that can accommodate more than one input or output port. Because of their unique capabilities, they require special consideration when being created, inserted and removed from Cal Manager's graph.

Note that the terms *input* and *output* depend on which way the data is flowing. During acquisition, data flows in from the sensor side of the Cal Line, and out to the instrument side. The reduction sequence proceeds in the opposite direction, so data flows in from the instrument and out towards the sensor. Physical components (attenuators, cables, splitters, switches, etc.) usually use the acquisition flow, while user processing components (combine, overlay, image process, etc.) use the reduction flow.

Cal Manager supports the following Multi-Port Cal Items:

- Adder
- Splitter
- Coax Switch
- Combine
- Overlay
- Image Branch
- Waveform Branch

Adders and splitters are both derived from the same Multi-Port Cal Item in the Inventory List. When first created, the number of ports must be specified, but the type (adder or splitter) is not defined until it is placed in the graph.

Coax switches are Multi-Port Cal Items because they can have multiple input or output ports. However, only one port can be active at a time. This active port can be set only from within the configuration dialog when it is inserted into a Cal Line. Like adders and splitters, the port source can be defined only when inserted into the graph.

Combine, Overlay and Image Branch items are for user-defined processing – their ports do not correspond to physical connections in the signal line.

5.3.1   Multi Port – Adders & Splitters

5.3.1.1   Category

WFM Reduction – Hard

5.3.1.2   Adder Discussion

Adders are Multi-Port Cal Items that have multiple active input ports and are created from the Multi-Port Cal Item in the Inventory List. The number of ports must be specified when the Adder is created in the Inventory List, and cannot be changed after the item is created.

Reduction calculations are not available with this type of Cal Item, as it is impossible to determine the amount of each adder input's contribution to the total adder output signal.
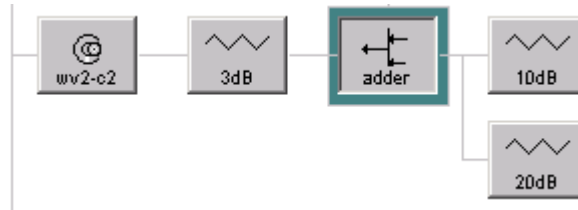
Figure 5-5 - Adder in a Cal Line

To attach Cal Items to Adders:

1. Insert the Cal Item to the right of the Adder by either:
   - Right-clicking the Adder and selecting Insert a new item to the RIGHT of this item from the popup menu
   - Using the Drag-and-Drop Inventory List to drop the Cal Item onto the Adder.
2. Select a port from the Port Selection dialog that is displayed next. If Cancel is selected from this dialog, the Cal Item will not be attached to the Adder.

If the new Cal Item is the first item attached to the Adder, it will reside to the immediate right and on the same line. Subsequent inputs are placed on lines just beneath the Adder's line. A port must be selected from the Port Selection dialog that is displayed before the item can be attached. Additional Cal Items then can be attached to these external inputs.

5.3.1.3 Splitter Discussion

Splitters are Multi-Port Cal Items that have multiple, active output ports. The splitter is derived from the Multi-Port Cal Item in the Inventory List. The number of ports must be specified when the splitter is created in the Inventory List, and cannot be changed after the item is created.

Outputs from the splitter are linked only after the item is added to Cal Manager's graph. The first output port connects to the Cal Item to the splitter's immediate left. This link is required and automatically made when the splitter is added to the graph; however, a port must be selected from the list of those that are available.

In the graph display, the splitter node is marked by a small arrow along its bottom edge. Cal Items that are attached to splitters contain an arrow pointing inward toward the center of the attached item to indicate the direction of the signal as it is acquired.

When Cal Items are inserted to the right of a node that connects to a splitter, that splitter output is reassigned to the new node. In other words, splitter outputs must be connected to the ends of other Cal Lines, not the middle. The only line that can have items after the splitter connection is the line containing the splitter itself. When a Cal Item connected to a splitter output is deleted, that Splitter port is freed and made available for reassignment to another Cal Item.

Splitter outputs may not be assigned so that the output would return to be an input to the splitter itself (self-referential or cyclic input). An output from a splitter may not be on the same line as the Splitter, or connect to Adder item inputs. Any attempt to make an illegal connection will trigger a warning message from CalMan, with an explanation of why the connection is illegal.
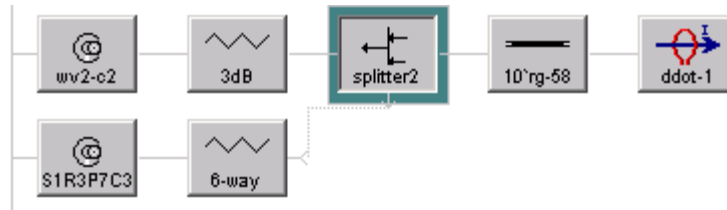
Figure 5-6 - Splitter in a Cal Line

To set splitter outputs:

1. right-click the splitter and select the pop-up menu item Set Output to Another Node.
2. left-click the node that is to accept the output signal from the splitter. This node must be one that is the absolute last node on a line.

To disconnect the node from the splitter, right-click the node to activate the pop-up menu then select Disconnect From Source. This also frees the port for use with another node.

To draw connecting lines from the Splitter to its external input, select Draw connecting lines for multi-port items from the Display Preferences dialog. Single-clicking on a node connected to a splitter output will highlight the connection. (Image or images)

5.3.1.4   Multi Port Item Data Dialog

5.3.1.4.1   **Dialog**

Figure 5-7 – Adder/Splitter Multi Port Configuration (Labeled as an Adder).

5.3.1.4.2   Discussion

Adders and Splitters have an initial standard configuration dialog, including the Curve and Delay controls. In addition, the number of input ports (Adder) or output ports (Splitter) must be assigned. Once assigned, the number of ports cannot be changed after the dialog is closed. Multiple characteristic curves may be assigned. The selected curve is assigned to a port using Curve Setup.

5.3.1.4.3   Details

Item	Description
Name	A unique Cal Item name to be used for inventory storage.
Description	Descriptive text to elaborate on the item.
Delay ns	Propagation delay through the Adder
Number of Ports	The number of input port for an Adder or output ports for a Splitter.
Curve	See the detailed discussion presented in Main Manual, Section 6.2.5.2.3.2. The control should be repeatedly used to assign characterizing curves to the ports selected in Curve Setup.
Curve Setup	Select a port to which to assign a characterizing curve using the Curve button.

5.3.1.4.4   Subdialogs

5.3.1.4.4.1 Curve

The Curve dialog as described in Main Manual, Section 6.2.5.2.3.2.

5.3.1.4.4.2 Switch Definition

5.3.1.4.4.2.1 Dialog
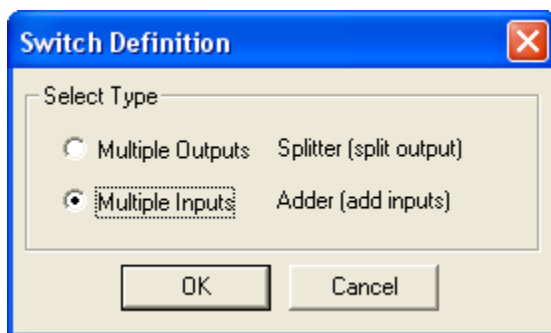
Figure 5-8 - Choose Adder or Splitter when Inserting the Item

5.3.1.4.4.2.2 Discussion

The dialog appears when the Cal Item is added as a node in a Cal Line. It is used to con-figure the node as an adder – sum multiple inputs into a single output – or a splitter – divide a single input into multiple outputs.

5.3.1.4.4.2.3 Details

Item	Description
Multiple Outputs	Splitter – Assign a single input data vector to multiple outputs.
Multiple Inputs	Adder – Sum the data at multiple input ports to a single output.

5.3.1.4.4.3 Port Selection

5.3.1.4.4.3.1 Dialog
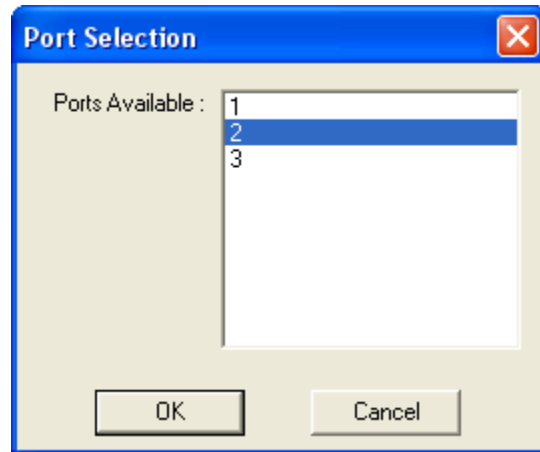
Figure 5-9 - Select the Input Port

5.3.1.4.4.3.2 Discussion

      The dialog appears when the Adder/Splitter node is first added to a Cal Line. It also appears when a new item is added to the right of an Adder or when "Set Output to Another Node" is selected from the right-click popup menu of a splitter. The dialog is used to select the port to which the input (Adder) or output (Splitter) cal item will be connected. The choice of ports will determine the characteristic curve to be applied to the data when reducing the item.

5.3.1.4.4.3.3 Details

5.3.1.4.4.4

Item	Description
Ports Available	List, by serial index, the Multi Port Cal Item ports to which no input (Adder) or output (Splitter) signal has yet been connected.

5.3.1.5 Icon

5.3.2 Coax Switch

5.3.2.1 Category

      WFM Reduction – Hard

5.3.2.2   Discussion

Coax Switches are Multi-Port Cal Items that can have multiple input or output ports, but only one of these auxiliary ports can be active at a time. The number of ports must be specified when the switch is created in the Inventory List, and cannot be changed after the item is created.
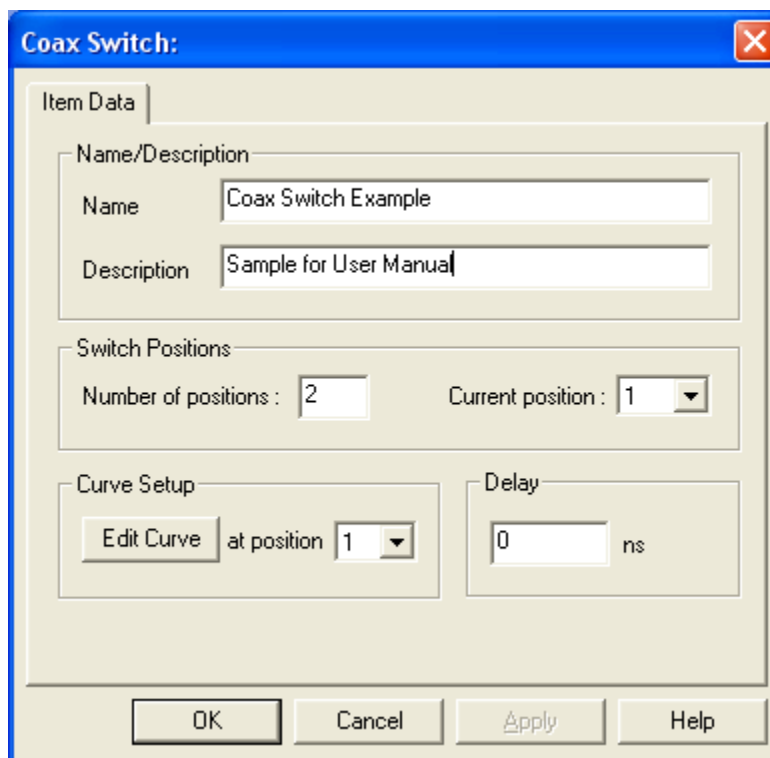
When the switch is placed into Cal Manager's graph, the switch direction must be specified multi-input or multi-output type. If the switch is a multi-output switch (like a splitter), a port must be selected for the Cal Item attached to the left. If it is a multi-input switch, an input port must be selected for Cal Items to its right.

Attaching Coax-Switches and selecting ports is done the same way as with Adders and Splitters. See 5.3.1.2 and 5.3.1.3.

To select the current switch port, double-click the switch node to display the Coax Switch's user interface. Under Number of Positions, Current select the current port.

5.3.2.3   Item Data

5.3.2.3.1   Dialog

Figure 5-10 - Coax Switch Configuration

5.3.2.3.2   Discussion

The Coax-Switch dialog configures Coax Switch Cal Items. These may be configured as a either a multiple input or output switch (the graph linking behavior is then similar to an Adder or Splitter respectively). The switch may be configured for any number of ports (input or output). The type of item, input or output, is determined only when the item is added to Cal Manager's graph.

Item	Description
Delay	Inherent time delay of the component.
Number of positions	Total number of ports (input or output).
Current position	The current entry determines which curve will be viewed/edited when Curve is selected. The number of available curves corresponds to the entry in the Number of Positions field.
At position	This determines the switch position that is viewed/edited when Curve is selected.

5.3.2.3.4   Subdialogs

The Curve dialog as described in Main Manual, Section 6.2.5.2.3.2.

5.3.2.4   Icon

5.3.3   Combines

5.3.3.1   Category

WFM Reduction – Soft

5.3.3.2   Discussion

Combines are Multi-Port Cal Items that use arithmetic to combine the reduction outputs from multiple nodes. Combine nodes are added and linked in the same way as Splitters (see section 5.3.1.3).

The Combine node can be configured to process a copy of the input data. If Process A Copy is selected on the Combine nodes Reduction page, the combined output will be displayed / printed / archived, but it will not be passed on to the next node in the line. In other words, the combine operation will be transparent to the other nodes in the line. If Process A Copy is not selected, the combine output becomes the input data for the next node in the line. Only user processing nodes can follow a Combine node that does not have Process A Copy selected (i.e., cables, attenuators, etc. cannot accept combine node output as their input).

5.3.3.3   Item Data

5.3.3.3.1   Dialog
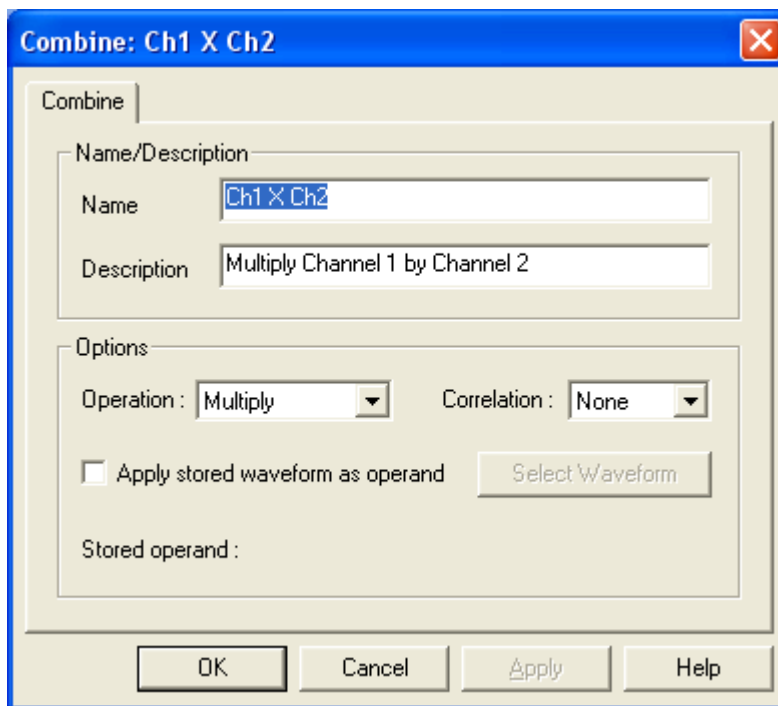
Figure 5-11 - Combine Item Dialog

5.3.3.3.2   Discussion

The Combines node performs basic arithmetic using waveform operands. Combine operands can be either output waveforms from other cal items, or waveforms stored in the database.

5.3.3.3.3   Details

Item	Description
Operation	The combine operation: Add, Subtract, Multiply, Divide, y vs y, Correlate only.
Correlation	If selected, automatically aligns the waveforms before overlaying. Quick correlation matches the 50% points of pulses' rising edges, Full correlation applies the frequency domain correlation function.
Apply stored waveform as operand	Select a waveform from the database, or define a polynomial, to combine with the input. This fixed input takes the place of an active data input port if the option is checked. When checked, the Select Waveform button is enabled. Otherwise it is disabled.
Select Waveform	Opens the standard Curve dialog to either define a polynomial or select a stored waveform to serve as one operand in the combine operation. This control is disabled unless Apply stored waveform as operand is checked.

5.3.3.3.4   Subdialog

The Curve dialog described in Main Manual, Section 6.2.5.2.3.2.

5.3.3.4   Icon

5.4 Mixers

5.4.1 *Category*

WFM Reduction – Hard.

5.4.2 *Discussion*

Mixers are used to perform down-conversion from high frequency signals to lower frequency signals that can be digitized by available technology. The mixer is the key item in narrowband waveform reduction, because it creates a frequency vs. time reference that is used by all other narrowband channels.

The mixer is one of the few Cal Items that produces multiple output waveforms. In addition to creating a power vs. time waveform, the mixer also generates frequency vs. time spectra. The power vs. time waveform is the output passed on to the other items in the Cal Line. As mentioned above, the frequency vs. time waveform can be referenced by other narrowband signal lines. Each of the output waveform types has configuration settings, which are accessible from the Settings button on the Reduction page.
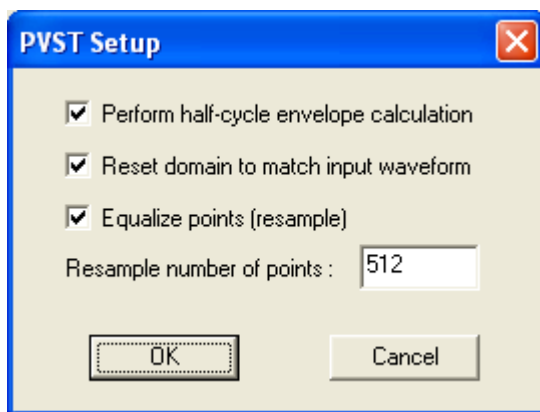
Figure 5-12 - Power Vs Time Settings
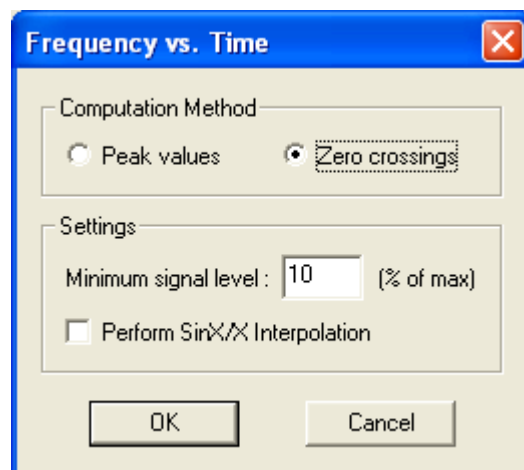
Figure 5-13 - Frequency Vs Time Settings.

The mixer is also one of the few items that uses multiple characterization curves. Because the mixer combines the RF data with a variable LO source, proper characterization requires characterization data at multiple LO frequencies. Selection of the operating LO frequency can be done manually, or by specifying an available LO channel. If the mixer references an LO channel, any changes to that local oscillator in Acquire will update the current LO frequency in the mixer node. Note that to receive the frequency change notification, CalMan must be running when the local oscillator is configured in Acquire.

5.4.3 Item Data

5.4.3.1   Dialog

Figure 5-14 - Mixer Configuration Dialog.

5.4.3.2   Discussion

The Mixer dialog configures Mixer Cal Items.

5.4.3.3   Details

Item	Description
LO Source	.
Frequency (GHz)	Current local oscillator frequency.
Power (dBm)	Current local oscillator power.
Frequency position:	High if the LO setting is above the RF frequency, Low if below.
Curve @ LO =	Local oscillator frequency for a mixer calibration file.
Curve	Activates the Curve dialog for assigning a reduction value (dB) or an actual characterization waveform.

5.4.3.4   Subdialogs

The Curve dialog described in Main Manual, Section 6.2.5.2.3.2.

5.4.4   *Icon*

5.5   Overlays

5.5.1   *Category*

WFM Reduction – Soft.

5.5.2   *Discussion*

Overlays are created and linked in the same way as the Combine node, but because they produce a display-only object (one that cannot be further processed), an Overlay output is always transparent to the other nodes in the line. During reduction, a node to the right of an Overlay will receive its input data from the node to the left of the Overlay. Overlay nodes can be placed anywhere in the graph.

5.5.3 Item Data

5.5.3.1   Dialog
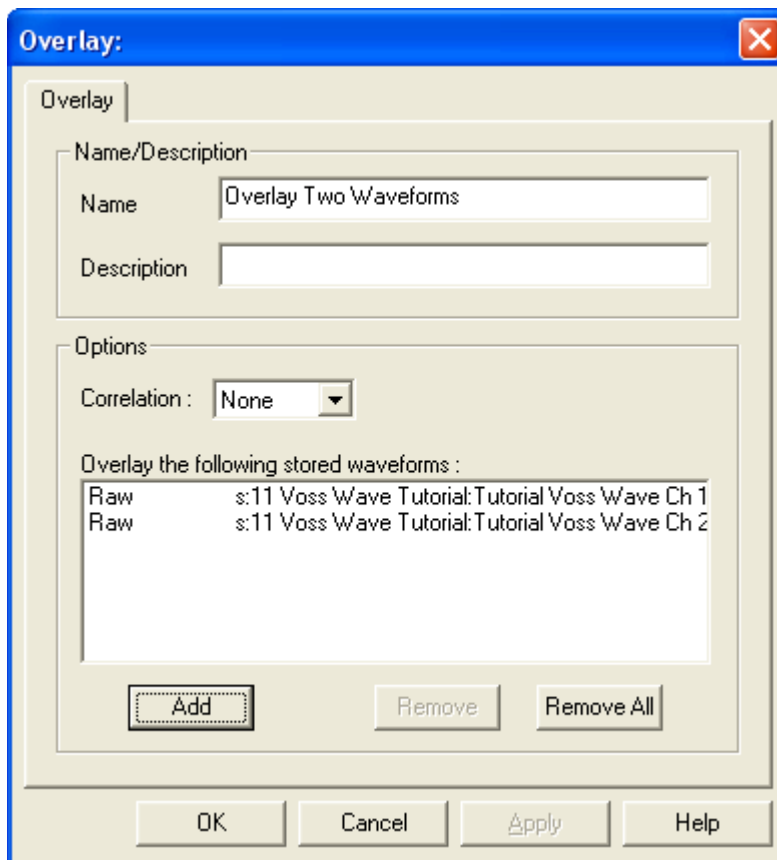
Figure 5-15 - Overlay Item Waveform Selection Dialog

5.5.3.2   Discussion

The Overlay item takes the signals from multiple Cal Items and/or waveforms stored in the database, and collects them in a single overlaid waveform. The Overlay may be comprised of up to eight database waveforms and any number linked of input sources.

5.5.3.3   Details

Item	Description
Correlation	If selected, automatically aligns the waveforms before overlaying. Quick correlation matches the 50% points of pulses' rising edges, Full correlation applies the frequency domain correlation function.
Overlay the following stored waveforms:	A list of database waveforms that will be included in the overlay.
Add	Adds a new waveform to the list of stored waveforms. Uses the Curve dialog to select the waveform.
Remove	Removes the current selection from the stored waveform list
Remove All	Removes all items from the stored waveform list

5.5.3.4 Subdialogs

The Add button opens the waveform portion of the Curve dialog described in Main Manual, Section <u>6.2.5.2.3.2</u>.

5.5.4 Icon

5.6 Sensors

5.6.1 Category

WFM Reduction - Hard

5.6.2 Discussion

The Sensor Cal Item (along with the Probe) is the typical item at the end of the Cal Line. As such, it provides the final conversion to physical quantities during data reduction. Sensor hardware is specified by first selecting the Sensor Class, which specifies the desired output quantities. Once the class is selected, the user interface builds a list of supported hardware for that class. Depending on the class, the user may also specify Transmission Line parameters. Changes to sensor type or transmission line type will automatically update the interface with the appropriate configuration parameters.

See the following section, "Sensor reduction formulae," for the reduction algorithms used by the available sensor types.

5.6.2.1 Sensor reduction formulae

This section provides the reduction equations for each supported sensor type and transmission line type. The first section contains the supported conversion units, followed by constants used in the formulae, and the constitutive equations.

Signal Class:

Narrowband   (RF)
Wideband   (UWB)

Sensor Class: (units)

Field sensors:

Power Density (W/cm^2)
E-Field   (V/m)
B-Field   (T)

Transmission line sensors:

In Line Power (W)
In Line Volts   (V)
In Line Amps (A)

Sensor Type:

Field sensors:	Signal class	Sensor class (no TM line)	Sensor class (with TM line)
1. D-dot	RF, UWB	PD, E, B	V, I, P
2. B-dot	RF, UWB	PD, E, B	V, I, P
3. Self integrating E-sensor	RF, UWB	PD, E, B	V, I, P
4. Open ended waveguide	RF	PD, E, B	NA
5. General Antenna	RF, UWB	PD, E, B	NA
6. Voltage divider	RF, UWB	NA	V, I, P
7. Current tap off	RF, UWB	NA	V, I, P
8. General coupler	RF	NA	P

Transmission line types:	Signal class	Sensor class	Sensor type
None	RF, UWB	PD, E, B	1,2,3,4,5
TEM coaxial	RF, UWB	V, I, P	1,2,3
TEM Strip/grnd	RF, UWB	V, I, P	1,2,3
TEM Parallel strips	RF, UWB	V, I, P	1,2,3
TM01 circular	RF	P	2
TE11circular	RF	P	2
TE10 rectangular	RF	P	1,2,3
Direct monitor	RF, UWB	V, I, P	6,7,8

Defined constants:

Permeability of Vacuum (Henry / meter)

$$\mu_0 = 4\pi \times 10^{-7}$$

Impedance of Free Space (Ω)

$$\eta_0 = 376.730$$

Speed of Light (meter / second)

c = 2.997925 x 10^8

Permittivity of Vacuum (Farad / meter)

$$\varepsilon_0 = 8.854 \times 10^{-12}$$

Free Space

$$V = IZ$$

$$\frac{dP}{dA} = \frac{E^2}{\eta} \times 10^{-4} = \frac{(cB)^2}{\eta} \times 10^{-4}$$

Transmission Line

$$E = cB$$

$$P = VI = \frac{V^2}{Z} = I^2 Z$$

D-Dot Direct Write data reduction

Constitutive equation:

$$E(t) = \frac{1}{\varepsilon_r \varepsilon_0 Z_0 A_{eq}} \int_{t0}^{tn} V_{out}(t') dt'$$

Required parameters:

Z_0 (Ω), A_{eq} (m²), ε_r, $V_{out}(t)$ (V)

Output Units: Volts/meter

D-Dot Detected data reduction

Constitutive equation:

$$E(t) = \frac{1.1254 \times 10^{-9} \sqrt{P_{out}(t)}}{\varepsilon_r \varepsilon_0 Z_0 A_{eq} F(t)}$$

Required parameters:

Z_0 (Ω), A_{eq} (m²), ε_r, $F(t)$ (GHz), $P_{out}(t)$ (W_{rms})

Output Units: Volts/meter (rms)

B-dot Direct Write

Constitutive equation:

$$B(t) = \frac{1}{A_{eq}} \int_{t0}^{tn} V_{out}(t') dt'$$

Required parameters:

A_{eq} (m²), $V_{out}(t)$ (V)

Output Units: Teslas

B-Dot Detected

Constitutive equation:

$$B(t) = \frac{1.1254 \times 10^{-9} \sqrt{P_{out}(t)}}{A_{eq} \cdot F(t)}$$

Required parameters:

Z_0 (Ω), A_{eq} (m²), ε_r, $F(t)$ (GHz), $P_{out}(t)$ (W_{rms})

Output Units: Teslas (rms)

Self-integrating E sensor Direct Write

Constitutive equation:

$$E(t) = \frac{V_{out(t)}}{\varepsilon_r h_{eq}}$$

Required parameters:

h_{eq} (meters), ε_r, $V_{out}(t)$ (V)

Output Units: Volts/meter

Self-integrating E sensor Detected

Constitutive equation:

$$E(t) = \frac{7.07107 \sqrt{P_{out(t)}}}{\varepsilon_r h_{eq}}$$

Required parameters:

h_{eq} (meters), ε_r, $P_{out}(t)$ (W_{rms})

Output Units: Volts/meter

Open-Ended Waveguide Detected (only)

Constitutive equation:

$$\frac{dP}{dA}(t) = \frac{P_{out}(t)}{A_{eff} \times 10^4} \qquad A_{eff} = A_{geom} 10^{\frac{5 - 2.74 \frac{f}{f_c}}{10}}$$

$$A_{geom} = wh \qquad f_c = \frac{c}{2w}$$

Required parameters:

$P_{out}(t)$ (W_{rms}), $F(t)$ (GHz)

Output Units: (W/cm²)(rms)

Waveguide List

Size	Height (m)	Width (m)
WR975	.1238	.2477
WR650	.0826	.1651
WR430	.0546	.1092
WR284	3.61	.0721
WR187	.0237	.0475
WR137	.01740	.0348
WR90	.01143	.0229

General Antenna Direct Write

Constitutive equation:

$$E(t) = \frac{274.591 V_{out(t)}}{\sqrt{A_{eff}}}$$

$$A_{eff} = 10^{\left(\frac{A_{eff(dB)}}{10}\right)}$$

Required parameters:

$V_{out}(t)$ (V), A_{eff} (cm²)

Output Units: (V/m)

General Antenna Detected

Constitutive equation:

$$\frac{dP}{dA}(t) = \frac{P_{out(t)}}{A_{eff}}$$

$$A_{eff} = 10^{\left(\frac{A_{eff(dB)}}{10}\right)}$$

Required parameters:

$P_{out}(t)$ (W$_{rms}$), A_{eff} (cm²)

Output Units: (W/cm²)(rms)

Voltage Divider Direct Write

Constitutive equation:

$$V(t) = \frac{V_{out}(t)}{C} \qquad C_{mult} = 10^{\left(\frac{C_{(dB)}}{20}\right)}$$

Required parameters:

$V_{out}(t)$ (V), C

Output Units: Volts

Voltage Divider Detected

Constitutive equation:

$$V(t) = \frac{\sqrt{50 P_{out}(t)}}{C} \qquad C_{mult} = 10^{\left(\frac{C_{(dB)}}{20}\right)}$$

Required parameters:

$P_{out}(t)$ (W$_{rms}$), C

Output Units: (volts)(rms)

Current Tap Off Direct Write

Constitutive equation:

$$I(t) = \frac{V_{out}(t)}{C} \qquad C_{mult} = 10^{\left(\frac{C_{(dB)}}{20}\right)}$$

Required parameters:

$V_{out}(t)$ (V), C(Ω)

Output Units: Amps

Current Tap Off Detected

Constitutive equation:

$$I(t) = \frac{\sqrt{50 P_{out(t)}}}{C} \qquad C_{mult} = 10^{\left(\frac{C_{(dB)}}{20}\right)}$$

Required parameters:

$P_{out}(t)$ (W$_{rms}$), C(Ω)

Output Units: Amps

General Coupler Detected (only)

Constitutive equation:

$$P(t) = \frac{P_{out(t)}}{C}$$

$$C_{mult} = 10^{\left(\frac{C_{(dB)}}{20}\right)}$$

Required parameters:

$P_{out}(t)$ (W$_{rms}$), C

Output Units: (watts)(rms)

Transmission Line Formulae

TEM coaxial line

Constitutive equation:

$$V(E) = -r_b \ln\left(\frac{r_a}{r_b}\right)E$$

$$I(B) = \frac{2\pi r_b}{\mu_0}B$$

$$Z = \frac{59.95}{\sqrt{\varepsilon_r}}\ln\left(\frac{r_a}{r_b}\right)$$

Required parameters:

r_a (radius of center conductor in meters), r_b

(radius of center conductor in meters),

ε_r, and either E(t) or B(t) from sensor.

Output Units: either V(t) (volts) or I(t) (Amps)

Lines of E and B
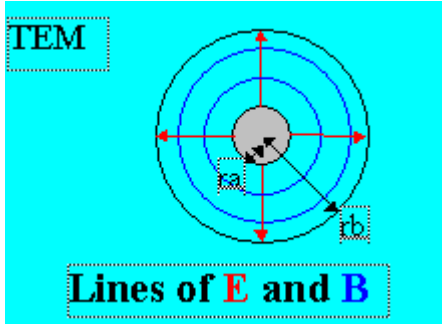
TEM Strip over a ground plane

Constitutive equation:

$$V(E) = hE$$

$$I(B) = \frac{\pi w}{\mu_0}B$$

$$Z_l = \frac{60\ln}{\sqrt{\varepsilon_r}}\left(\frac{6}{u} + \frac{2\pi - 6}{u}e^{-\left(\left(\frac{30.666}{u}\right)^{0.7528}\right)} + \sqrt{1 + \left(\frac{2}{u}\right)^2}\right)$$

$$where \rightarrow u = \frac{W}{h} + \frac{t}{\pi h}\ln\left(1 + \frac{h}{t}\frac{4e}{\coth^2\sqrt{6.517W/h}}\right)$$

Required parameters:

h (meters), w (meters), t (meters),

ε_r, and either E(t) or B(t) from sensor.

Output Units: either V(t) (volts) or I(t) (Amps)

Lines of E and B

TEM parallel strips

Constitutive equation:

$$V(E) = hE$$

$$I(B) = \frac{\pi w}{\mu_0}B$$

$$Z_l = \frac{120\ln}{\sqrt{\varepsilon_r}}\left(\frac{6}{u} + \frac{2\pi - 6}{u}e^{-\left(\left(\frac{30.666}{u}\right)^{0.7528}\right)} + \sqrt{1 + \left(\frac{2}{u}\right)^2}\right)$$

$$where \rightarrow u = \frac{2W}{h} + \frac{2t}{\pi h}\ln\left(1 + \frac{2h}{t}\frac{4e}{\coth^2\sqrt{2\bullet6.517W/h}}\right)$$

Required parameters:

h (meters), w (meters), t (meters),

ε_r, and either E(t) or B(t) from sensor.

Output Units: either V(t) (volts) or I(t) (Amps)

Lines of E and B
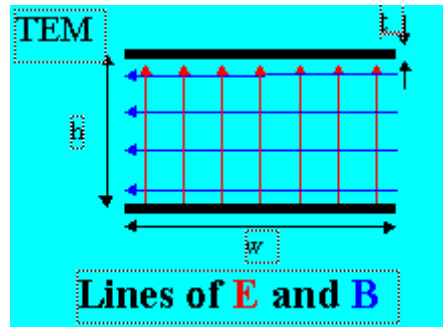
TM01 Circular Waveguide

Constitutive equation:

$$P = 7.4948 \times 10^{14} \left(Br\right)^2 \sqrt{1 - \left(\frac{2.405c}{2\pi fr}\right)^2}$$

Required parameters:

r (meters), f (Hz), and B(t) from sensor.

Output Units: P(watts) (rms)

Lines of E and B
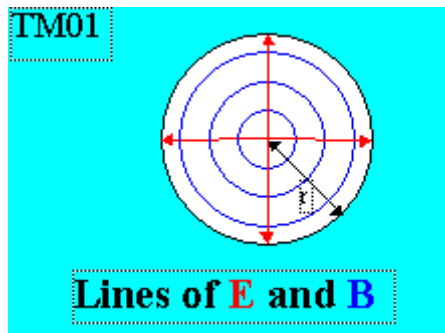
TE11 Circular Waveguide
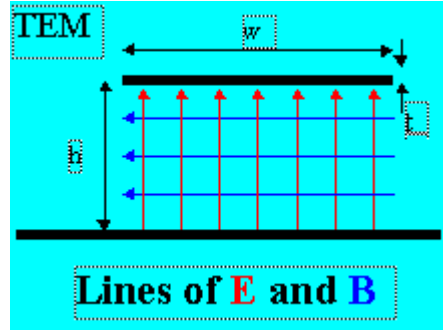
Constitutive equation:

$$P = 3.4234 \times 10^{-2} \left(r^2 Bf\right)^2 \sqrt{1 - \left[1.84118c/2\pi rf\right]^2}$$

Required parameters:

r (meters), f (Hz), and B(t) from sensor.

Output Units: P(watts) (rms)

Lines of E and B
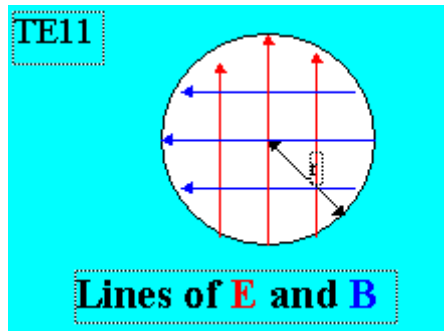
TE10 Rectangular Waveguide

Constitutive equation:

$$P = \frac{hw}{2} \frac{E^2}{\eta} \sqrt{1 - \left(\frac{c}{2fw}\right)^2}$$

$$P = \frac{hw\eta}{2} \left(\frac{B_y}{\mu}\right)^2 \frac{1}{\sqrt{1 - \left(\frac{c}{2fw}\right)^{(2)}}}$$

Required parameters:

h (meters), w (meters), f (Hz),

ε_r, and either E(t) or B(t) (rms) from sensor.

Outpt Units: P (watts) (rms)

Lines of E and B
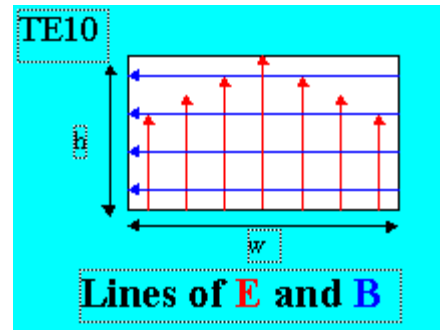
5.6.3   Item Data

5.6.3.1   Dialog

Figure 5-16 - Sensor Reduction Dialog.

5.6.3.2   Discussion

The Sensor dialog configures sensor Cal Items. These can be configured to simulate many different classes and types of sensors. The Sensor Class must be selected to configure the desired output units, and the Sensor Type must be selected to best describe the actual sensor in the acquisition line. As always, an up to date calibration waveform should be assigned to the sensor's curve for accurate data reduction.

5.6.3.3   Details

Item	Description
Sensor Class	Desired output units for the reduced waveform
Delay ns	Signal propagation delay through the sensor.
Sensor Type	Available sensor types (d-dot, b-dot, antenna, etc.)
parameters	parameter list dependent on the selected sensor type
Curve	specifies a characterization curve, for those sensor types that require one
Transmission Line Type	Available transmission lines (circular, rectangular, etc.)
transmission parameters	parameter list dependent on the selected transmission line type

5.6.3.4   Subdialogs

The Curve control opens the standard characteristic curve dialog of section Main Manual, Section 6.2.5.2.3.2.

5.6.4   Icon

5.7   User Process

5.7.1   Category

WFM Reduction - Soft

5.7.2   Discussion

The User Process Cal Item gives the user the ability to specify custom processing as part of the data reduction sequence. This Cal Item does not represent a physical signal line device.

When the User Processing Definition button is selected, the Process Data dialog is activated. The dialog contains standard calculator functions and many other waveform-processing functions. A list of processing operations can then be specified. These will be applied during reduction in the order listed. The Process Data dialog is also available in Analyze and contains the same processing functions. The processing list used by this Cal Item is simply a macro list, identical to those created in Analyze.

When a new User Process item is created, the Process Data dialog will start up on the Macro tab. Press the Record-Start button, then select individual operations (on the other tabs) to add to the list. When you are done adding operations, press Record-Stop or simply close the Process Data dialog. If the Cal Item already contains a list of operations, the Process Data dialog will start up in record mode, with the current list of operations displayed. See 2.4.8 for more information on the Process Data dialog and creating macros.

An analogous item, Image Process, is available for automatically processing image data. Like the User Process item, the Image Process interface is also available in Analyze for manual processing.

5.7.3 Item Data

5.7.3.1 Dialog
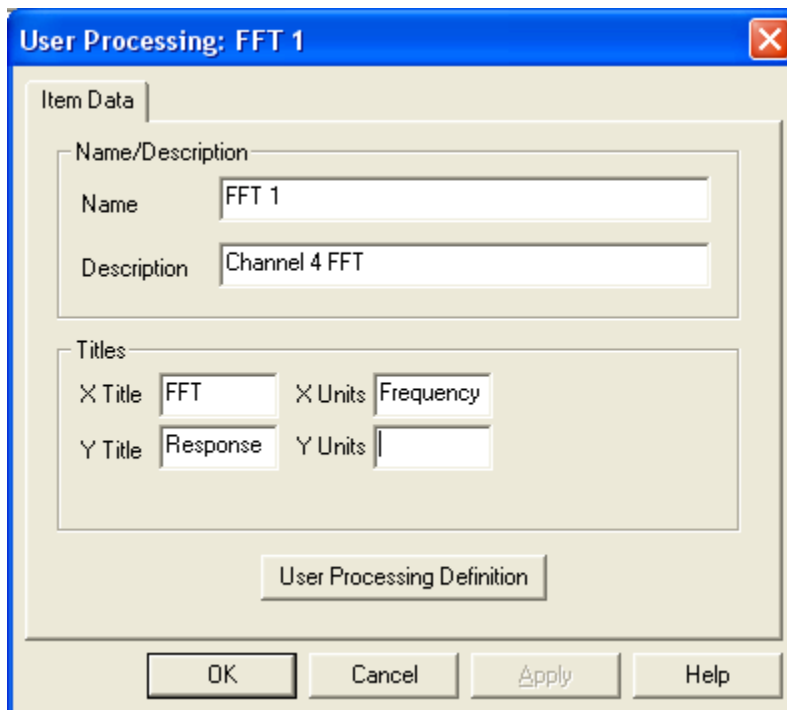
Figure 5-17 - User Process Item Data Dialog

5.7.3.2 Discussion

The User Process dialog configures User-Process Cal Items. These are special processing Cal Items and do not represent real signal line devices.

The User Process item performs basic calculator functions on the input waveform (e.g., multiplication by a constant, logarithms, absolute value). When the User Processing Definition button is selected, the Process Data dialog is activated, which contains all of the calculator functions and many other waveform-processing functions. The Process Data dialog is also available in Analyze, and contains the same waveform processing functions. When used in a Cal Manager acquisition line, input signal and all macros recorded in the Process Data dialog create a waveform based on the input waveform and the waveform-math operations defined in this item.

5.7.3.3 Details

Item	Description
X Title	Displayed x axis title for the reduced waveform
Y Title	Displayed y axis title for the reduced waveform
X Units	Displayed x units for the reduced waveform
Y Units	Displayed y units for the reduced waveform
User Processing Definition	Activates the Process Data dialog, which defines various waveform math functions that are used to apply to the item's input waveform. The same dialog is also available in the Analyze module for operating on the currently displayed waveform.

5.7.3.4   Subdialogs

5.7.3.4.1   Calculator

5.7.3.4.1.1 Dialog
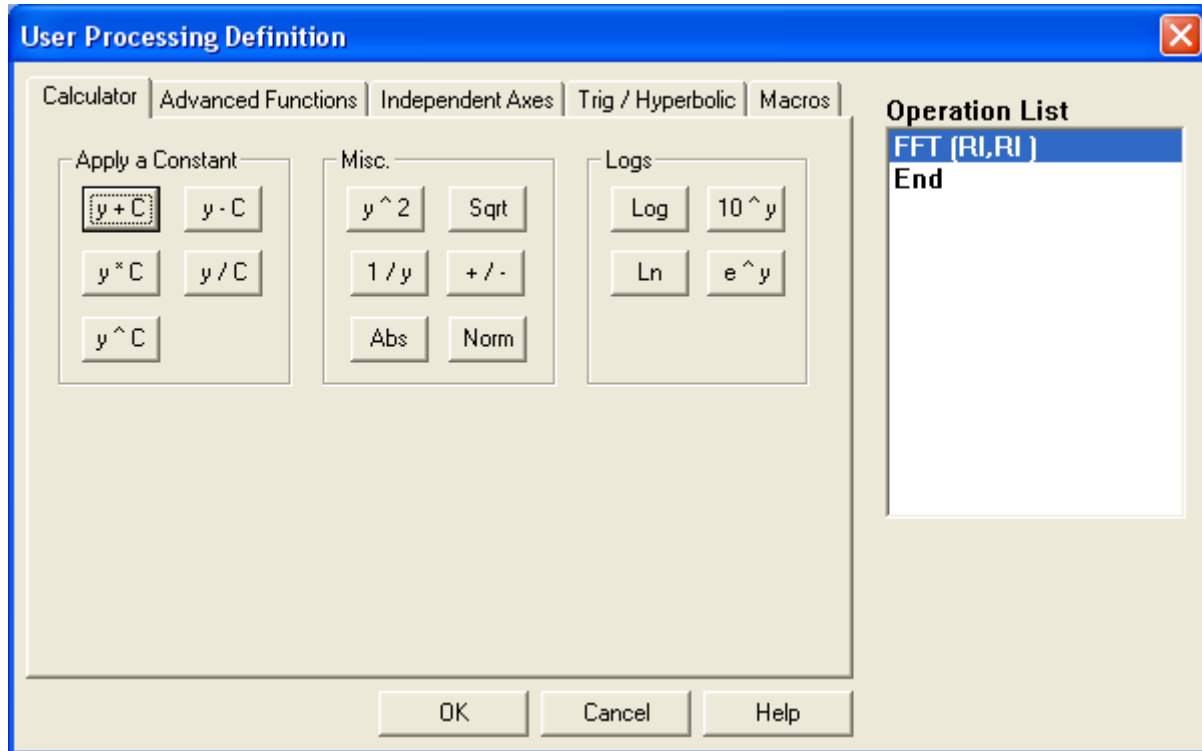
Figure 5-18 - User Process General Calculator

5.7.3.4.1.2 Discussion

The Calculator waveform processing page applies common calculator functions to the waveform (e.g., multiplication by a constant, logarithms, absolute value). Operations on this page are immediately applied to the active waveform. To undo any applied operations, use Cancel on the Process Data property sheet.

5.7.3.4.2   Advanced Functions

5.7.3.4.2.1 Dialog
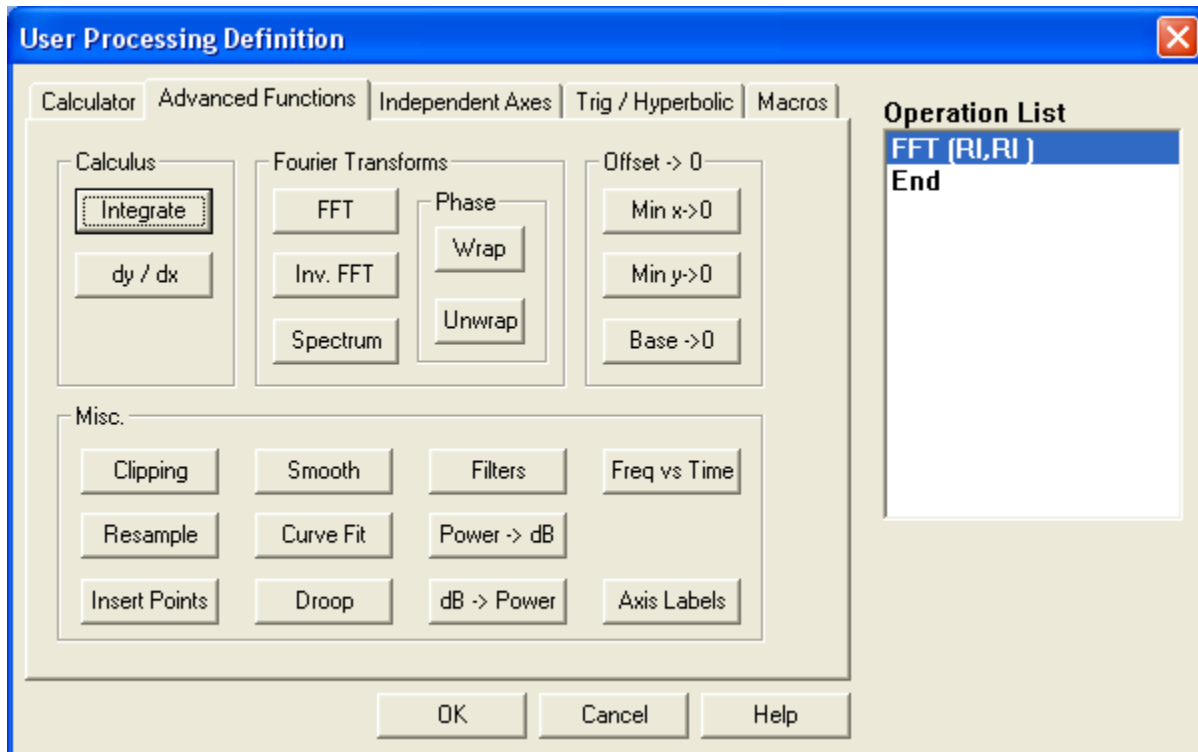
Figure 5-19 - Advanced User Process Functions

5.7.3.4.2.2 Discussion

The Advanced Functions waveform processing page applies advanced functions to the waveform, such as integration, FFTs, curve fits, and filtering. Operations on this page are applied immediately to the active waveform. To undo any applied operations, use Cancel on the Process Data property sheet.

5.7.3.4.3   Independent Axes

5.7.3.4.3.1 Dialog
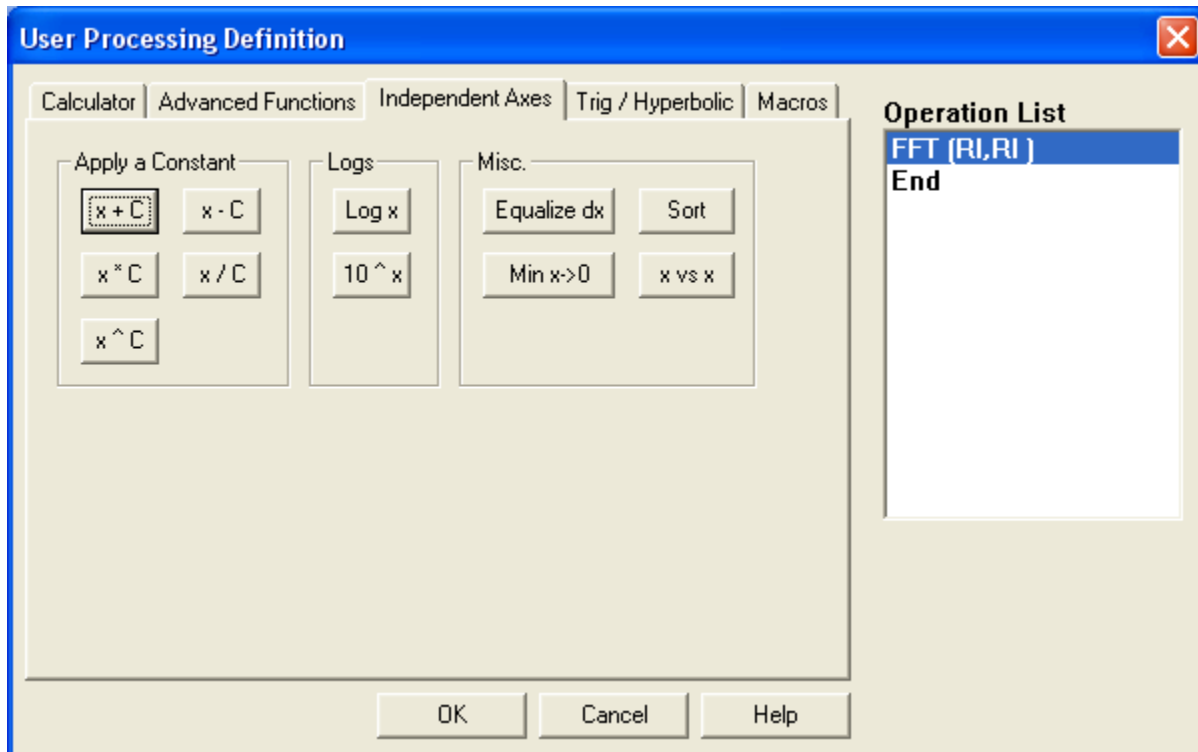
Figure 5-20 - User Functions on the Independent Access.

5.7.3.4.3.2 Discussion

The Independent Axes waveform processing page processes the x values of the x/y pair data. Operations on this page are immediately applied to the active waveform. To undo any applied operations, use Cancel on the Process Data property sheet.

5.7.3.4.4   Trig/Hyperbolic

5.7.3.4.4.1 Dialog
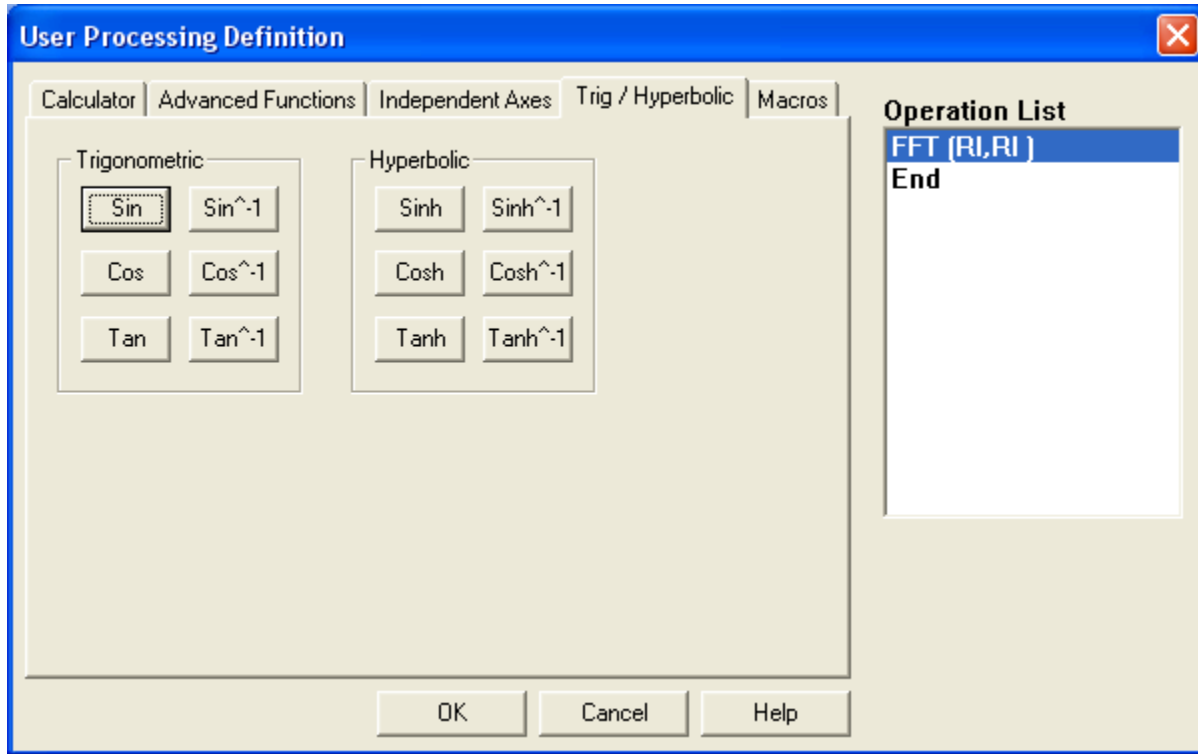
Figure 5-21 - Trigonometric User Functions.

5.7.3.4.4.2 Discussion

The Trigonometry waveform processing page performs basic trigonometric functions on the waveform, such as sine, cosine, and tangent. Trigonometric operations typically generate test waveforms or filters. Operations on this page are immediately applied to the active waveform. To undo any applied operations, use Cancel on the Process Data property sheet.

5.7.3.4.5   Macro

5.7.3.4.5.1 Dialog
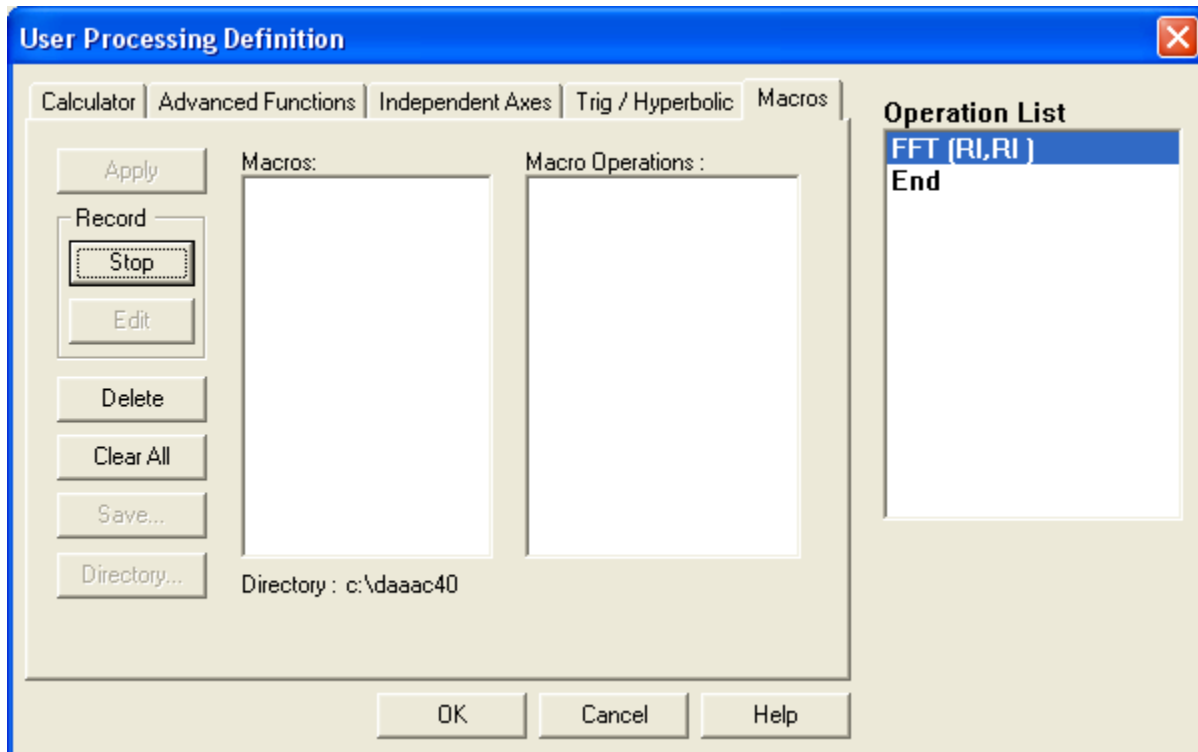
Figure 5-22 - User Function Macro Control Tab.

5.7.3.4.5.2 Discussion

   The Macro waveform processing page combines operations from the other processing pages into a single macro operation. Macros can be created, saved to files, read from files, and applied to the waveform from this page.

      To create a macro, choose (Record) Start and the processing sheet will expand and display a list of operations with a single item called End (marks the end of the list). You can now go to any other page (except Create Waveform) and select an operation to include in the macro. New operations are always inserted before the highlighted operation in the list. When you are done recording, return to the macro page and choose (Record) Stop. A <new> entry will be placed in the list of available macros, and the macro definition will appear in the Macro Operations list.

      Newly recorded macros are stored in temporary memory. You can apply the new macro to the waveform by choosing Apply, but if you select any other macro from the list, the new macro will be overwritten. To create a permanent macro, choose Save and specify a name. The macro will then appear in the list with the specified name.

      To apply a stored macro, use the Directory button to select the macro definition directory. A list of available macros will appear in the Macro list. Select a macro from the list and choose Apply. The definition of the currently selected macro will appear in the Macro Operations list.

Each macro is stored as a separate binary file that can be copied or moved, or opened by any DAAAC module that supports macro operations. Use the Directory button to select the current macro directory.

Undo and Apply Last Operation - Macros are treated as atomic operations, i.e. Undo and Apply Last will undo or apply all of the operations included in the macro.

5.7.4 *Icon*

5.8   Waveform Branch

5.8.1 *Category*

WFM Reduction – Soft.

5.8.2 *Discussion*

Waveform Branch nodes create multiple copies of their input during reduction, to produce multiple outputs for further processing. They are used to perform multiple computations on the same data. If desired, the various branches can then be recombined later using a Combine node. Waveform Branch nodes are added and linked in the same way as Adder nodes (see section 5.3.1.2).

5.8.3 *Item Data*

5.8.3.1   Dialog
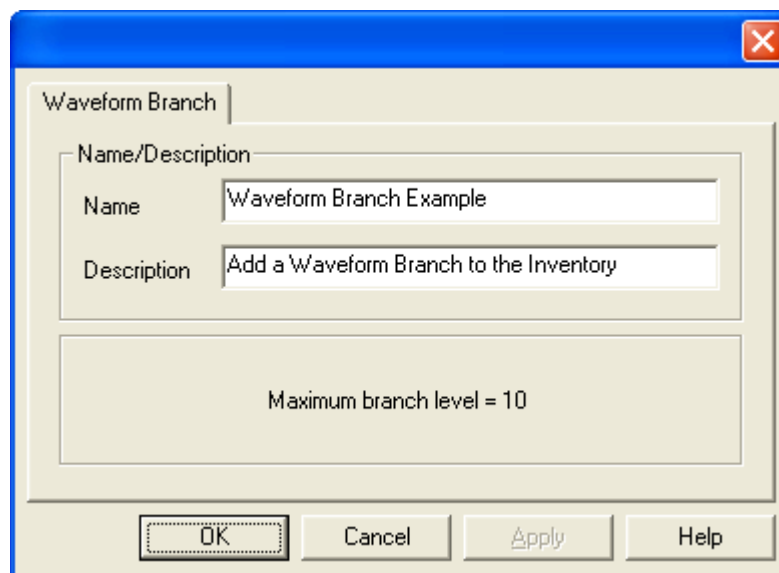
Figure 5-23 - Waveform Branch Configuration

5.8.3.2   Discussion

The Waveform Branch Cal Item requires no configuration beyond a unique name. As with all items, an optional description is also available.

5.8.3.3   Subdialogs
None

5.8.4   Icon

5.9   Image Combine

5.9.1   Category
IMAGE Reduction - Soft

5.9.2   Discussion
This cal item produces an output image that is the simple mathematical combination of two input images. The images may be added, subtracted, multiplied or divided. One input image will be taken from an image item node to the left of the combine node. The other image may be either another item node or a raw or processed image stored in the DAAAC database, or an image stored in a file.

5.9.3   Item Data

5.9.3.1   Dialog
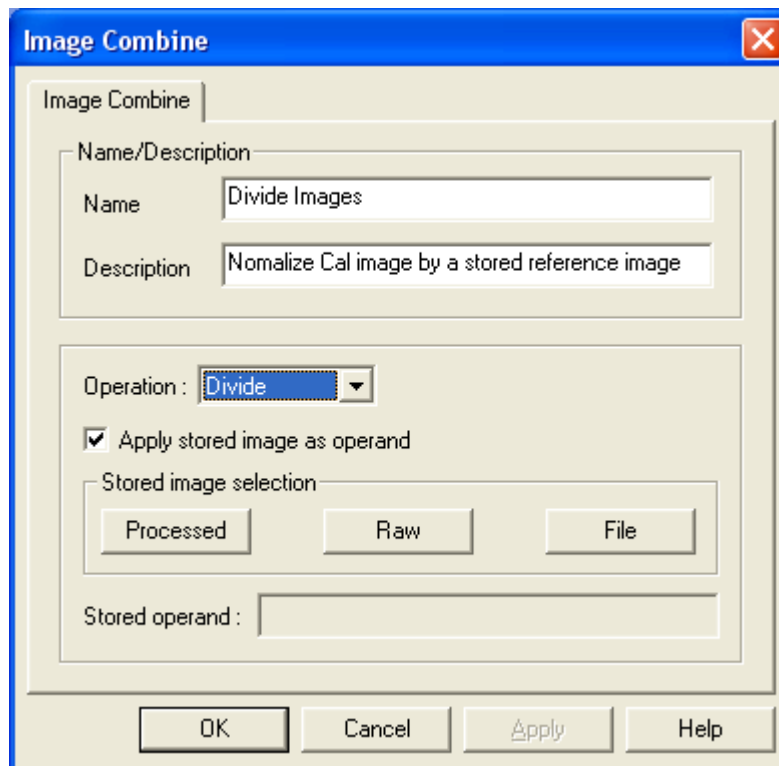
Figure 5-24 - Image Combining Configuration

5.9.3.2 Discussion

The simple dialog is primarily used to specify the operation – add, subtract, multiply or divide that is to be used to combine the images. If one input image is to be a DAAAC-stored image or an image stored in the file, the input image is specified here.

5.9.3.3 Details

Item	Description
Name	Brief descriptive identifier of the cal item node.
Description	More extensive description of the cal item.
Operation:	Select the operation used to combine the input images – add, subtract, multiply or divide.
Apply stored image as operand	Checking this box indicates that one of the two images to be applied is to be taken from data stored in DAAAC or from an input file. With this control checked, Processed, Raw and File are enabled. Otherwise they are disabled.
Processed	Open the Waveform Selection dialog (Main Manual, Section 3.4) to allow a DAAAC-stored processed image to be selected as input to the cal item. This control is disabled unless Apply stored image as operand is selected.
Raw	Open the Waveform Selection dialog (Main Manual, Section 3.4) to allow a DAAAC-stored raw image to be selected as input to the cal item. This control is disabled unless Apply stored image as operand is selected.
File	Image file input is not yet supported. This control is disabled unless Apply stored image as operand is selected.
Stored operand:	

5.9.3.4 Subdialogs

Waveform Selection dialog. See Main Manual, Section 3.4.

5.9.4 Icon

5.10 Image Divider

5.10.1 Category

IMAGE Reduction - Soft

5.10.2 Discussion

This cal item splits a single input image into multiple output images. The image may be deinterleaved, in which case the node produces two output images: one from the even-numbered image pixel rows and one from the odd-numbered rows. The other option is to segment the image by independently defined quadrants into four separate images.

5.10.3 Item Data

5.10.3.1 Dialog

Figure 5-25 - Image Divider Node Configuration

5.10.3.2 Discussion

This dialog determines how the input image is to be subsampled into the output images.

5.10.3.3 Details

Item	Description
Division Type:	Select between Deinterlacing or quadrants (Rectangular). With Rectangular selected, Rotation (degrees):, Use default region sizes and Region: are enabled. Left:, Right:, Top: and Bottom: may also be enabled. Number of regions: is set to 4. With Deinterlacing selected, all controls below Division Type are disabled and Number of Regions: is set to 2.
Rotation (degrees):	
Number of regions:	Number of output images. This value is fixed at '4' if the Division Type: is Rectangular and '2' if the type is Deinterlacing.
Use default region sizes	If the Rectangular Division Type: is selected, this control determines if the selected regions are to be divided automatically by segmenting the input im-

	age in half vertically and horizontally, or if each region is to be independently specified by selecting the left, right, top and bottom pixel limits. If checked, Left:, Right:, Top: and Bottom: are disabled. If the Deinterlacing Division Type: is selected this control is disabled.
Region:	If the Division Type: is Rectangular and Use default region sizes is disabled, this control selects the region to which the values entered in Left:, Right:, Top: and Bottom: are to be applied. This control is disabled if Division Type: is Deinterlacing and it has no meaning if User default region sizes is checked.
Left:	Set the input image left pixel boundary for the subsampled region specified in Region: This control is disabled if the Division Type: is Deinterlacing or if Use default region sizes is checked.
Right:	Set the input image right pixel boundary for the subsampled region specified in Region: This control is disabled if the Division Type: is Deinterlacing or if Use default region sizes is checked.
Top:	Set the input image top pixel boundary for the subsampled region specified in Region: This control is disabled if the Division Type: is Deinterlacing or if Use default region sizes is checked.
Bottom:	Set the input image bottom pixel boundary for the subsampled region speci-fied in Region: This control is disabled if the Division Type: is Deinterlacing or if Use default region sizes is checked.

5.10.3.4 Subdialogs

None

5.10.4 Icon

5.11   ND Filter

5.11.1   *Category*
IMAGE Reduction - Soft

5.11.2   *Discussion*

5.11.3   *Item Data*

5.11.3.1   Dialog
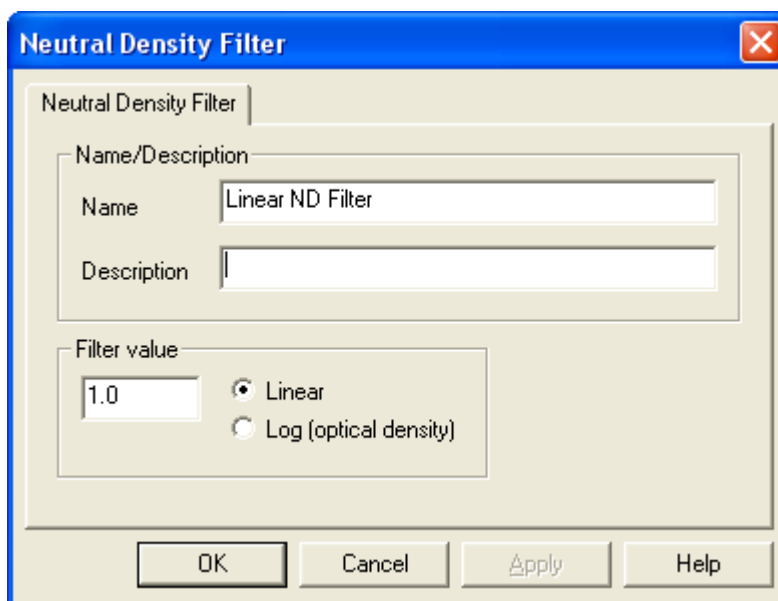
Figure 5-26 - Neutral Density Filter Node

5.11.3.2   Discussion

5.11.3.3   Details

Item	Description
Filter Value	
Linear	
Log (optical density)	

5.11.3.4   Subdialogs
None.

5.11.4   *Icon*

5.12   Image Process

5.12.1   Category

  IMAGE Reduction - Soft

5.12.2   Discussion

  The Image Process cal item produces a single output image that is an altered version of the input image. The input image is subjected to a user-defined macro that contains operations that alter it. Operations may include filtering, transforming and color adjustment.

5.12.3   Item Data

5.12.3.1   Dialog
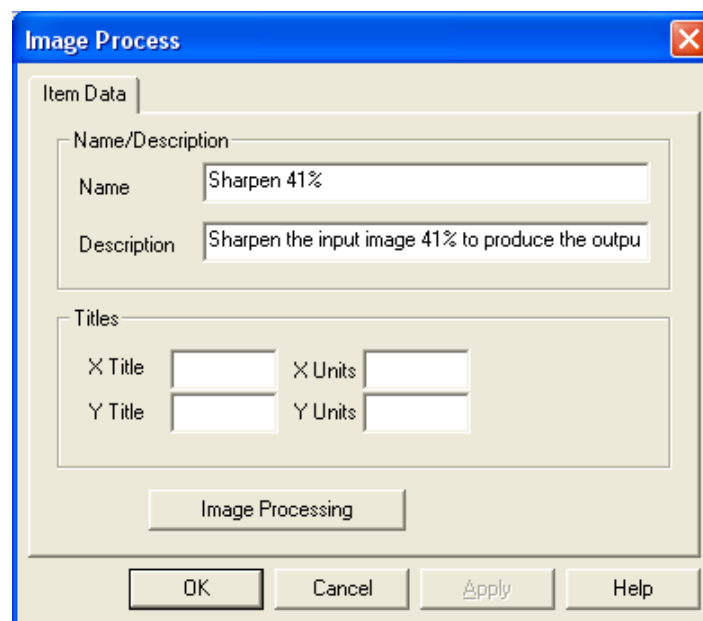
Figure 5-27 - General Image Processing Node

5.12.3.2   Discussion

  The dialog presents a simple interface that allows the image horizontal and vertical axes to be labeled. A single button opens the Process Image Data subdialog that is defined in detail in section 2.4.9. The subdialog is used to construct the macro of operations to be performed on the input image to produce the output image.

5.12.3.3   Details

Item	Description
X Title	Label the horizontal axis
X Units	Define the values of the horizontal axis
Y Title	Label the vertical axis
Y Units	Define the values of the vertical axis
Image Processing	Open the Process Image Data subdialog.

5.12.3.4 Subdialogs
Process Image Data. See section 2.4.9.

5.12.4 Icon

5.13   Image to Contour

5.13.1 Category
IMAGE Reduction - Soft

5.13.2 Discussion
This cal item converts the input image to and output contour plot. The contour plot represents boundaries of values in the input image and can serve as a crude edge detector. Contour boundaries are defined by:

- Custom list of levels. The custom list may be initiated by performing a level range configuration, then copying them to the List of Levels using Create List. The list may then be edited.
- Level Range. Define a uniform series of levels by specifying a minimum and maximum value, a step size and a count of the levels.
- Automatically. Distribute the specified number of boundaries uniformly over the value range of the image.
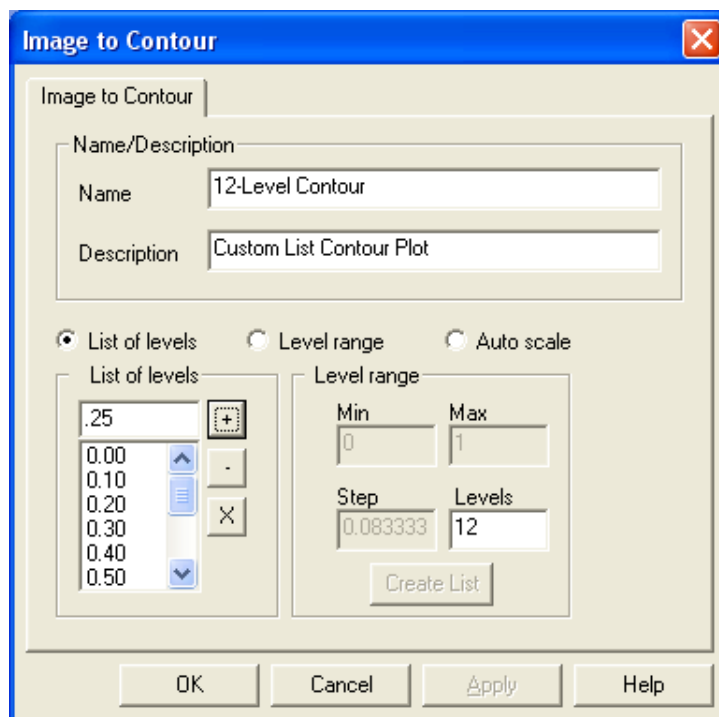
5.13.3 Item Data

5.13.3.1 Dialog

Figure 5-28 - Image Contour Plot Configuration.

5.13.3.2 Discussion

The dialog is used primarily to specify the contour level boundaries. For all methods of specification, a count of the number of boundaries to be used is given. Boundaries may then be specified by placing custom and independent levels into a list, specifying a value range over which to uniformly distribute the levels or allowing the node to automatically and uniformly distribute the specified number of boundaries over the value range of the image.

5.13.3.3 Details

Item	Description
List of levels	When selected, individual, specific contour levels may be manually entered into the list of contour levels to display. With this control selected, +, - and X are enabled. Min, Max, Step and Create List are disabled.
+, -, X	These controls are enabled only when List of levels is selected. They are used to edit the list of labels in the associated list box. The list box may be initially populated by automatically defining a Level Rand, then clicking Create List to move the uniform level distribution to the list box. + Add the current level to the list. - Remove the currently selected level from the list. X Remove all list entries.
Level range	When selected, a range of contour levels, from Min to Max incremented by Step, may be created. Selecting this option disables +, - and X. Min, Max, Step and Create List are enabled.

Min	Enter the minimum contour level to display. This is enabled only when Level range is selected. Adjusting this value will adjust Step to keep the combination of Min, Max, Step and Levels consistent.
Max	Enter the maximum contour level to display. This is enabled only when Level range is selected. Adjusting this value will adjust Step to keep the combination of Min, Max, Step and Levels consistent.
Step	Enter the increment value for the number of Levels to plot. This is enabled only when Level range is selected. Adjusting this value will adjust Levels to keep the combination of Min, Max, Step and Levels consistent.
Levels	Enter the number of levels to plot for the increment value entered in Step. In Level range mode, adjusting this value will adjust Step to keep the combination of Min, Max, Step and Levels consistent.
Create List	Use this button to generate a uniform list of levels in the List of levels list box, using Min, Max, Step and Levels to compute the values. This is enabled only when Level range is selected.
Auto scale	When selected, the program will create a default range of levels for the number of contours (approximately) for the value entered in the Levels field. This selection disables +, -, X, Min, Max and Step.

5.13.3.4 Subdialogs

None.

5.13.4 Icon

5.14 Image to Wfm

5.14.1 Category
IMAGE Reduction - Soft

5.14.2 Discussion

5.14.3 Item Data

5.14.3.1 Dialog

Figure 5-29 - Image->Waveform Conversion.

5.14.3.2 Discussion

5.14.3.3 Details

Item	Description
Single column	Enter the column number to display. If Entire column is checked, the total contents of the column is selected. If not checked, then enter the Row begin and end range.
Single row	Enter the row number to display. If Entire row is checked, the total contents of the row is selected. If not checked, then enter the Column begin and end range.
Multi column	Enter the Begin to End Columns to display. If "Entire column" is checked, all rows of the range of "Begin" to "End" rows are selected.

Multi row	Enter the range of Row and Column data to select.
Average	average data values over the selected rows or columns – not implemented
Sum	sum data values over the selected rows or columns
Integrate	integrate data values over the selected rows or columns – not implemented
Column Begin	This is the start of the column range to select.
Column End	This is the end of the column range to select.
Entire Column	Select the entire column.
Row Begin	This is the start of the row range to select.
Row End	This is the end of the row range to select.
Entire Row	Select the entire row.

5.14.3.4 Subdialogs

None.

5.14.4 Icon

5.15 Image Branch

5.15.1 Category

IMAGE Reduction - Soft

5.15.2 Discussion

Image Branch nodes create multiple copies of their input during reduction, to produce multiple outputs for further processing. They are used to perform multiple computations on the same data. If desired, the various branches can then be recombined later using a Combine node. Image Branch nodes are added and linked in the same way as Adder nodes (see section 5.3.1.2).
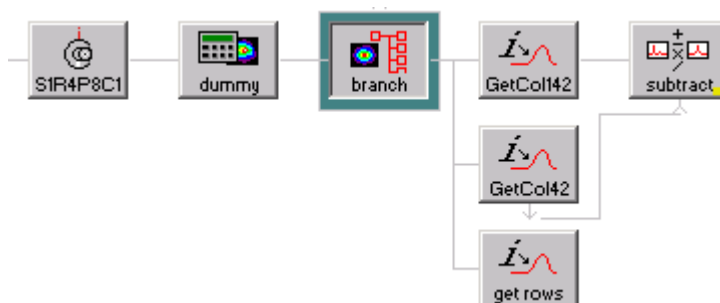
Figure 5-30 - Branching Image Data.
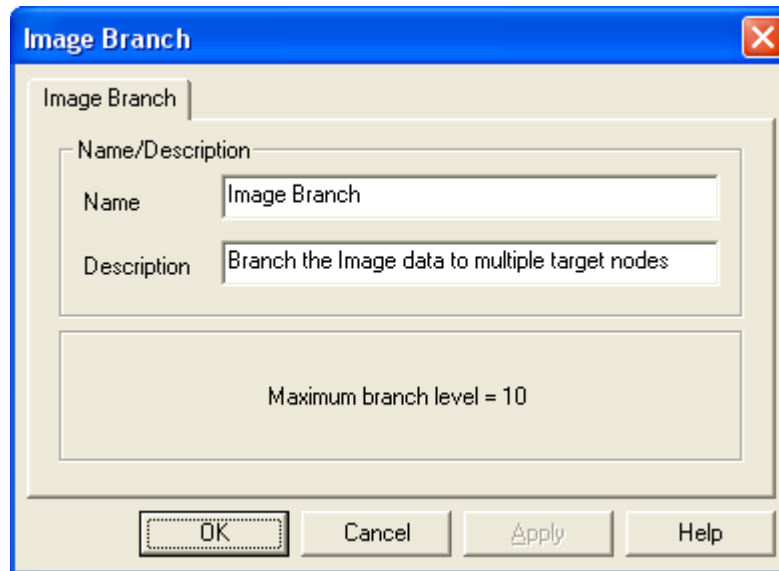
5.15.3 Item Data

5.15.3.1 Dialog

Figure 5-31 - Image Branch Node Configuration.

5.15.3.2 Discussion

The dialog has no controls other than name and description.

5.15.3.3 Details

None.

5.15.3.4 Subdialogs

None.

5.15.4 Icon

5.16   FROG

5.16.1   Category
IMAGE Reduction - Soft

5.16.2   Discussion

5.16.3   Item Data

5.16.3.1   Dialog

Figure 5-32 - FROG Node Configuration.

5.16.3.2   Discussion

5.16.3.3   Details

Item	Description
Optical nonlinearity	optical method used to collect the image
Grid size	the input image data is reduced to a grid of the specified size prior to running the iterative calculations
X-axis is:	specifies the data orientation
Max iterations	maximum number of algorithm iterations to run before stopping, regardless of the error level
Error level	target error level between the constructed and input image. Processing stops when this error level reaches or falls below this value.
Filter	selectable image filter to be applied before the iterative processing
Delay Increment	scale for the delay axis

5.16.3.4 Subdialogs

None.

5.16.4 Icon

6 Appendix F – DAAAC Installation File Structure

6.1 DAAAC CD Contents

For the most part, the DAAAC CD does not contain compressed or encrypted files. The CD contains ordinary files that are part of the DAAAC system, files that are used to support DAAAC installation and files to support certain specialized instruments. The files are mainly executables (.exe extension) that are Windows programs and Dlls (dynamically linked libraries) that are loaded by executables and provide some additional functionality. There are also help files (.hlp, .cnt, .gid), other documentation in text files (.txt), training materials which are mainly Microsoft PowerPoint presentations (.ppt), screen capture and other image files (mainly .jpg) and a few miscellaneous types such as binary firmware images for some special instruments. The DAAAC CD contains the following directories:

6.1.1 Demo

o A non-interactive system demo

6.1.2 Setup

o acqiris_2.15 – O/S drivers for Acqiris cPCI instruments, Acqirislive, documentation for Acqiris software
o aerotech – dll's required by DAAAC for Aerotech stages DOES NOT include Aerotech O/S drivers.
o O/S driver and dll for Avantes USB spectrometer
o AVT - O/S drivers for AVT Marlin firewire cameras, directions for use are in Instructions.txt
o BitFlow - O/S drivers, windows software to operate Phoenix Indigo cameras using BitFolw interface. Directions in Roadrunner.txt at top level
o BNS – self extracting install including O/S drivers and application software for Boulder Nonlinear Systems ferroelectric SLM system.
o CKDrv – self extracting installation of Crypkey anti-piracy system used by DAAAC setup and required for DAAAC to function.
o CopyIn – a directory used to distribute late additions and bug fixes to DAAAC. The DAAAC setup program unconditionally copies .dll files from this folder to the DAAAC installation directory at the end of the installation. Intended primarily to distribute bug fixes at large facilities such as DARHT.
o daaac40 – contains basic DAAAC system files, all executables including those for special systems (e.g. calacq, antrangeacq, etc), driver and other DAAAC dlls, base system dlls (e.g. leadtools imaging software, bar code software) and help files.

- o DAO – Microsoft Data Access Objects are the officially sanctioned, re-distributable Microsoft Access (jet engine) ODBC drivers. Installed by DAAAC setup the first time its run on a machine
- o EPIX – O/S device driver for EPIX cameras, dll used by DAAAC for EPIX cameras.
- o Gage – self extracting O/S install, test programs for Gage scope cards, directions in readme.txt
- o Getting Started – training material for DAAAC, general information, registry patch for early releases of XP-SP2
- o idl – dlls used to retrieve DAAAC DB waveforms from within IDL and documentation with examples in DaaacIDL.doc
- o Keys – directory for DAAAC system keys used by DAAAC setup. Keys (files named daaac4_x.ovl(.xp)) are required during first time installations and this is the default location for them, if present at subsequent installs the keys here will overwrite those in the DAAAC directory.
- o L3_AWE – a custom TCP Socket to RPC adapter program and a sample Java client.
- o logapi –files required for a user written application to write data to the user defined log pages. Documentation in Log_Interface.doc
- o matlab –files required to retrieve DAAAC DB waveforms from within MatLab. Documentation in MatLabDllDoc.doc
- o NationalInstr –NI-IMAQ data files required to use certain SU320 cameras with a Nation Instruments 1422 card in DAAAC. Instructions in Su Camera.txt
- o NetAcquire –the interface for remote control of Acquire by a client application.
- o NewPort2 –O/S drivers and windows application software for Newport stages driven by the ESP6000 card.
- o OceanOptics –Ocean Optics O/S drivers and application software for OO USB spectrometers. Directions for use in README.txt and OOI Cleanup and Reinstall.doc
- o ODBC – contains various Microsoft applications to install ODBC to systems lacking it (older windows 2000 and NT systems) update the DAO drivers to the last release. These programs are invoked by DAAAC setup the first time it is run.
- o Pico_Motor – a standalone application for controlling pico-motors over Ethernet.
- o QImage – O/S drivers and application software for Qimaging Firewire cameras.
- o QuickFrog – a custom version of the QuickFrog Java application that can be controlled via a DAAAC instrument driver.
- o RemoteControl – an application allowing remote DAAAC computers to be rebooted, and to restart DAAAC – NOT functional on machines later than XP-SP1. Also contains network BER diagnostic functions.
- o RoperDrivers –O/S drivers, auxiliary dlls required by DAAAC for Roper Scientific PiMax and Photometrics cameras. Several versions are here for different uses. Some documentation in NewPVCamInstall.txt
- o SharedDLLs –Microsoft dlls required by DAAAC – these may be copied by the setup program into [windows/system32] on older systems, or into the DAAAC directory on newer ones.
- o STG –current firmware images for the A and B model STGs and some special application variants as well as directions for re-flashing an STG (Firmware update through boot loader Instructions.doc), the STG users manual and a stand alone console application for controlling an STG.

o   Weather Monitor II –a standalone program for continuously logging data from a WM-II weather station. This data can be read by a special DAAAC "instrument" driver.

6.2   DAAAC Installed Files

Most of the DAAAC software is written to the DAAAC install directory selected on first time install. Typically this will be C:\daaac40, or C:\Program Files\daaac40. The DAAAC directory contains the main DAAAC executable files (Archive, Analyze, Calman, Acquire32 and Netcom) as well as some less commonly used executable files such as license.exe. It also contains all of the primary DAAAC dll files. These dlls contain all of the DAAAC instrument drivers, mostly divided up by manufacturer (hence TekDrivers, HPDrivers, AcqirisDrivers, etc), cal items, common analysis functions, image processing functions, and database access functions. The DAAAC directory also contains the DAAAC system key files (daaac4_?.ovl, daaac4_?.ovl.xp) that determine the functionality of a given installation, and the DAAAC system help files.

In addition to the DAAAC directory, certain common files are installed in the Windows system directory. These are Microsoft or third party dll files that must reside in the system directories to work correctly. The DAAAC installer will only install these files if they are newer than any that are already present. Microsoft assures us that this practice is always safe.

DAAAC also installs ODBC (Open Data Base Connectivity) drivers for the Microsoft Access jet engine and SQL server. These drivers are not present in Windows by default, but may already be present if some other packages, such as Microsoft Office, have been installed. As with Microsoft system dlls, these components will only be installed or updated if they are not present or are out dated.

In all DAAAC systems, a system service called "Crypkey License" will be installed and activated. This service is essential to the feature keying system in DAAAC and it will not function if this service is absent or disabled. In addition, on some installations, there will be service(s) called "Net Instrument Server (2)" which provide limited network functionality, and "Dave-NT Netcom" which provides network database functionality.

Finally DAAAC installs a substantial amount of information in the system registry. This information is divided into two groups – settings common to all users, and user specific settings. Common settings are stored in Hkey_Local_Machine\Software\VSI and include such things as error logging level, network settings, and product serial number. User specific settings, such as window size and placement, analysis display settings, and current database, are stored in Hkey_Current_User\Software\VSI. These settings can be different for each user logged into the machine.

7 Glossary

Acquire The DAAAC module that manages communication between instruments and the DAAAC station. Acquire displays the instrumentation racks as they are physically arranged. Rearranging the rack setup is a simple drag-and-drop task. Also, Acquire can capture data directly during acquisition, or download data stored in instrumentation.

Adders Multi-Port Cal Items are components that have multiple input ports, any number of which can be active simultaneously. Adders are created with the Multi-Port Cal Item in the Inventory List.

Analyze The DAAAC module that displays and prints data, and provides tools for analyzing and manually processing waveforms and images.

Archive The DAAAC module that provides the user interface to the database. From Archive, users can change databases, import or export data, and organize and transfer data.

Burst A multi-shot acquisition event in which all shot data is accumulated in the acquisition hardware before being transmitted to the control computer.

Cal Items The DAAAC representation of physical components that are included in a signal line, such as sensors, attenuators, and cables. Also includes components for automated signal processing.

Cal Lines Data acquisition signal lines, such as channels stemming from instruments, that include components – called Cal Items – leading to a signal source.

Cal Manager (CalMan) The DAAAC module that documents every channel's signal path, providing a graphical display of the test setup and organizing the signal line components. CalMan uses this information to automatically reduce the data to physically meaningful quantities by unfolding the effects of components, or Cal Items.

Channels An instruments input or output ports.

Characterization data The defining set of parameters that describes the effects of a Cal Item within a signal line. DAAAC uses these parameters during automatic reduction to unfold the signal as received by the sensor.

Coax-Switches Multi-Port Cal Items that have multiple input or output ports; however, only one of each can be active simultaneously. Coax-Switches are created with the Multi-Port Cal Item in the Inventory List.

Figures of Merit (FOMs) Metrics computed from acquired or processed data. Some examples of figures of merit are X min and max, Y min and max, risetime, falltime, and pulse width.

Global Settings A collection of controls for configuring "global" acquisition settings. These features include configuring activity logs, creating new tests, and defining the acquisition parameters.

Graph The two-dimensional representation of CalMan's documented signal lines. Includes connection information for instruments, channels, and signal line components.

Instrument Any controllable device that is used in an acquisition sequence. Recording instruments (e.g. digitizers, cameras, spectrum analyzers) collect and convert an analog signal into digital data. Other instrument types include signal generators and positioners.

Inventory data Identification data that is unique for each Cal Item. Inventory data includes serial numbers, bar code numbers, model numbers, and property control numbers.

Inventory List DAAAC's inventory of Cal Items.

Item Data Data that characterizes each Cal Item, including the name and description as well as electrical characteristics.

Multi-Port Cal Items Signal line components that have multiple input or output ports, such as Adders, Splitters and Coax-Switches.

Named Configurations An entire test system description that can be pre-configured and recalled in seconds, which makes test reconfiguration a simple point-and-click task. Also, instruments can be configured from their front panels and DAAAC 4.0 will capture and store those settings for use in future tests.

Named Configuration View The Archive display of the various Named Configurations used for restoring DAAAC to a previous test setup, as well as copying Named Configurations to other databases.

NetCom The DAAAC module that provides an interface between the other DAAAC modules and the database.

Nodes Graphical elements in CalMan's graph that represent the various signal line components.

ODBC The Object Data Base Connectivity programming standard.

Processed waveforms / images Data that have been changed or edited after acquisition.

Raw waveforms / images Data that have been retrieved from an instrument and have not been processed.

Reduced waveforms / images Data that have been processed after acquisition by applying the item specific algorithms specified in the CalMan module.

Reduction Data Post-processing settings for each node in CalMan's graph.

Shot A single acquisition event.

Signal lines Also called Cal Lines, signal lines are the signal paths that stem from an recording instrument to a sensor. They are comprised of various components, called Cal Items.

Splitters Multi-Port Cal Items that have multiple output ports, all of which are active simultaneously.

Station A single computer that has instrumentation connected to it via GPIB or other interface to form a data acquisition system.

Test An organizational unit for grouping multiple acquisition events.

Trash The cache of deleted waveforms and images. Trashed data may be recovered.

Waveform View The Archive View that displays raw and processed data by date.

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